CHAPTER 2

ALFA COMPANY SHOPS SUPERVISOR

In a Naval Mobile Construction Battalion (NMCB), the equipment maintenance branch is composed of four sections: administrative, automotive repair, heavy equipment repair, and support shops. These sections, or shops, come under the overall supervision of the maintenance supervisor, who is normally a CMCS. As a CM1, you may be assigned as an inspector or a shop supervisor in any one of these shops within the maintenance branch. In small units (CBMUs, BMUs, and so forth) and large detachments, it is common to have a CM1 working as the maintenance supervisor.

In your role as shop supervisor, inspector, or maintenance supervisor, you will not only need to call upon all of your past experience, but also you will have to be constantly alert for new ideas and ways of accomplishing your mission within the time frames allotted. Of course, skillful predeployment planning is essential; but deployments rarely go according to plan, especially with equipment. Remember, in addition to facing unusual maintenance problems not encountered at a public works duty station, you must be ready to pack your gear and mount out at any given moment.

This chapter describes the composition of different equipment maintenance branch shops and small units. It describes the duties and responsibilities you will be expected to perform. Remember, these duties and responsibilities may vary in each battalion, small unit, or detachment, Assignments are made by the maintenance supervisor.

One of the most important tasks is to stay abreast of developments in equipment maintenance. Here are some publications to consult that will help you keep up to date: *Naval Construction Force Manual,* NAVFAC P-315; *Naval Construction Force Equipment Management Manual,* NAVFAC P-404; *Naval Construction Force Safety Manual* (COMCB-PAC/COMCBLANTINST 5100.1 series); COM-CBPAC/COMCBLANT and NAVFACINST 11200 series; Civil Engineer Support Office Maintenance Bulletins; Equipment Officer Technical Bulletins; and Equipment Officer Modification Work Orders.

SETTING UP A MAINTENANCE BRANCH

Currently most areas that Naval Construction Force (NCF) units, especially Mobile Construction Battalions (MCBs), deploy to, have maintenance facilities already in place. Normally only upgrading and maintenance of these areas is required. However, during a contingency, your unit could go into an area without any facilities. In this instance you will be required to assist the maintenance supervisor in setting up the maintenance branch. In the event that you are attached to a small unit as the senior CM (maintenance supervisor), it will be up to you to set up the maintenance branch and make it operational.

AREA SELECTION

The number and types of vehicles to be maintained are an important consideration in selecting the area, determining the size of the shop, and in laying out the shop. Placement is most important. If possible, avoid locating the shop in a low-lying area. Select a site large enough to allow for expansion, near the center of activity where there are existing roadways and parking areas. Proper layout will reduce maintenance bottlenecks and induce equipment to flow through the shop. You can obtain more information on the physical arrangement of buildings from the *Facilities Planning Guide,* NAVFAC P-437, especially in chapter 1.

HEAT, LIGHT, AND VENTILATION

Heat, light, and ventilation for a large, permanent maintenance shop are included in the plan specification. However, the installation of these facilities in the small or temporary shop depends on the maintenance supervisor.

The decision of whether to heat your shop depends upon its geographical location. Heaters should be arranged to provide warmth where it is most needed. Persons working at benches or in the shop store require more heat than people working in the main shop for comparatively short periods. For this reason, you should place heaters in corners convenient to workbenches and away from shop doors.

For adequate lighting, most maintenance shops depend upon lights arranged in the overhead of the main shop, lights and windows near the workbenches, and extension lights that can be plugged into electrical outlets. When you are in charge of setting up a maintenance shop, make sure that enough electrical outlets are provided for extension lights and electric power tools. Only the most elaborate shops have enough windows for efficient lighting.

Removing exhaust gases becomes a big problem in every maintenance shop. Large doors in the front and rear of the shop and windows at the workbenches normally supply all the fresh air needed, but even these are inadequate to remove excessive amounts of exhaust gases. These gases rise and are trapped in the shop overhead unless roof openings with ventilating fans are provided. Normally, it is up to the supervisor of a temporary shop to provide his own method of ventilation. A piece of flexible steel or neoprene hose attached to the exhaust on a running engine and carried outdoors through an opening in the building will serve the purpose. Do not allow any unnecessary operation of an engine inside the shop.

When stationary gasoline or diesel engines are used to produce power in the maintenance shop, provide exhaust outlets for them. Do not depend on natural ventilation through door and windows.

At least once during each deployment have the maintenance shop evaluated by the local base industrial hygienist, if the service is available. Do this through your battalion safety office.

TOOLS AND EQUIPMENT

The quantities and kinds of tools and equipment required for a maintenance shop vary with each shop. In deciding what tools and what type of equipment to have on hand, consider two factors: (1) the operational needs of the battalion and (2) the cost of the work at a component overhaul facility. Of course, the needs of the service come first, but not entirely without cost justification. Base your decision concerning the second factor solely on the facts and figures given in transportation maintenance management reports.

In a maintenance shop setup for repairing all types of equipment, you will coordinate and supervise work on many different types; therefore, study carefully the layout of the shop and the placement of shop equipment. You will probably be the one to decide whereto put the shop equipment. This is where experience counts, You should know where the repair equipment is needed and where it will be accessible to the operators who will use it. Without careful planning you can waste a lot of space and time in shifting equipment from one place to another. If space in the main shop is critical, special repair equipment can be put in smaller shops or rooms adjoining the main shop.

Power tools, such as drill presses and bench grinders commonly used in repairing all kinds of equipment, should be located in or near the main shop area. The locations of other power tools, such as hydraulic or electric lifts, valve grinders, and machines for aligning wheels and relining brakes, depend on where the tools will be best utilized. **The master switch that controls all power in the shop should be installed where it can be reached quickly in an emergency.**

In placing power tools, secure the legs or bases to a level surface strong enough to support them and make sure they will not move or bounce when in use. Before connecting stationary, electrically operated power tools to power outlets, be sure that each one is positioned so that the starting and stopping switch is within easy reach of the operator. **Ground-fault interrupters should be installed to prevent accidental electrical shock.** When the connection is complete, test the tools to ensure that the installation is safe. Also, let your mechanics operate them and consider any suggestions they may have for improvements. As always, make sure your tool and equipment operators wear protective gear. Double-check often, looking for ways to improve the efficiency, as well as the safety, of the whole maintenance shop.

Welding equipment must be operated in an area apart from the rest of the shop. Post hazard warning signs in the area and equip it with fire-fighting equipment. Erect screens that will confine flying sparks to reduce the chances that they will start fires or get into somebody's eyes.

Tire repair equipment should also be in a separate section of the shop, located near one of the shop entrances. With this arrangement, tire tools, tube-patching equipment, and air hoses can be used by the EOs as readily as by the CMs.

Before deciding where to place an air compressor (the large shops have more than one), consider the uses you have for air and where the air outlets would be most convenient. Compressed air is needed for operating pneumatic power tools, cleaning parts, and inflating tires. By keeping compressor lines as short and free of bends as possible, you minimize drops in air pressure at the outlets. Short lines do not collect as much water as long lines and are therefore less likely to freeze in cold weather. When you have long lines, install condensation traps in them and drain the traps daily.

Battery-charging equipment must be in a well-ventilated section of the shop away from the welding area, or in a separate well-ventilated, explosiveproof building. Because hydrogen fumes produced by a charging battery are highly explosive, always install an exhaust fan near the battery charger. Make sure a water outlet is available because an approved eyewash and shower have to be installed so that anyone involved in a battery shop accident can be bathed immediately to prevent severe burns. **Delay in diluting or washing out sulphuric acid from a victim's eyes could result in loss of sight.**

SAFETY

Safety is everyone's responsibility. It is a never-ending job that cannot be left to one individual or one office. Everyone must always be alert to accident prevention. It is imperative that you emphasize safe working practices to the point that they are routine.

One of the basic rules of shop safety requires that everyone behave himself. Practical jokes and horseplay cannot be tolerated. The possible consequences of such actions are too high a price to pay for the little humor derived.

You can help prevent accidents by appointing a shop safety petty officer to detect unsafe practices, bad habits, and defective tools that would otherwise go unnoticed. You should replace your shop safety petty officer periodically, thereby rotating these duties.

You can reduce the number of personal injuries in a shop by requiring good housekeeping practices; for example, keeping the shop floor free of grease and oil to help prevent mechanics and others from slipping or falling. Likewise, clearing the floor of creepers, stray tools, and parts will eliminate the chances of tripping over them.

Accidents and injury may be reduced or cut to zero by starting each day with a stand-up safety lecture. True, this absorbs valuable time, but it is worth it.

Crack down on bad habits, such as leaving jack handles sticking out into walkways and leaving vehicle doors open while mechanics work underneath.

THE MAINTENANCE SUPERVISOR

The battalion equipment maintenance supervisor, usually a CMCS, is responsible for that battalion's entire equipment maintenance program and all assigned CESE for the battalion and all its assigned detachments. The senior CM of a detachment, working in the equipment maintenance shop, is the maintenance supervisor for that detachment site. Maintenance supervisors have direct control over the administrative section. Specifically their duties include the following:

1. Control and supervision of all maintenance personnel, through the shop supervisors.
2. Ensuring adherence to the scheduled preventive maintenance program.
3. Ensuring accurate cost control, record maintenance, and updating.
4. Submitting equipment reports to the ALFA Company commander and the commanding officer for distribution to higher authority.
5. Maintaining the Construction Mechanics' tool allowance and ensuring that biweekly tool inventories are conducted.
6. Providing technical and safety training.
7. Providing technical assistance to the supply and logistics officer with regard to repair parts.
8. Ensuring quality control of the repair and maintenance work.
9. Ensuring that the Battalion Equipment Evaluation Program (BEEP) is carried out under the latest instructions.
10. Ensuring that the preventive maintenance schedule is entered into the ALFA Company minicomputer equipment program. The use of the minicomputer can then aid in the execution of the preventive maintenance program.

SHOP INSPECTORS

One of the keys to a successful maintenance program is good shop inspectors. Shop inspectors need maturity and tact when dealing with shop supervisors who are often militarily senior. Chapter 9 of this TRAMAN covers the duties and responsibilities of shop inspectors more completely.

AUTOMOTIVE SHOP SUPERVISOR

The automotive shop supervisor, who is usually a CMC, has direct control over the automotive repair shop and works directly for the maintenance supervisor. Among this supervisor's duties are the following:

1. Controlling and supervising all maintenance personnel assigned to the shop
2. Ensuring that preventive maintenance is performed under current instructions
3. Submitting accurate maintenance records to the cost control section
4. Maintaining the mechanics' tool kits and conducting required inventories
5. Providing necessary technical and safety instruction and-leadership
6. Ensuring that all work listed on EROS is performed and that any additional work is authorized, recorded, and performed
7. Ensuring that only top quality work is performed in the shop

HEAVY SHOP SUPERVISOR

The heavy equipment repair supervisor, who is usually a CMC, has direct control over the heavy equipment repair shop and works directly for the maintenance supervisor. In addition to the duties of the automotive repair supervisor just listed, the heavy equipment repair supervisor is responsible for the assignment and supervision of the field maintenance crew and injector shop if one is established.

Field Maintenance

The importance of field maintenance and field repairs cannot be overemphasized. The success or failure of the deployment from an equipment maintenance standpoint, and in some cases from the project standpoint, can be traced to the unavailability of equipment because of poor field maintenance or inability to perform adequate and timely repairs in the field. Experienced field mechanics are worth their weight in gold, and the heavy equipment repair supervisor must be careful in the selection of the field mechanics, even to the point of shortchanging himself in the shop. In the long run, good field maintenance will reduce the shop workload and improve the operator's concern for the equipment. Remember, it is the responsibility of the heavy equipment repair supervisor to provide the tools and equipment required by the field mechanics.

Injector Shop

When an area or shop has been established to repair injectors and injection pumps, it will normally be under the supervision of the heavy equipment repair supervisor. In addition to the necessary testing equipment, an injector repair shop requires a method of controlling the temperature and cleanliness.

SUPPORT (OR 5000) SHOP SUPERVISOR

The support (or 5000) shop supervisor, usually a CMC, reports directly to the maintenance supervisor. This supervisor is responsible for training, supervising, and cent rolling personnel performing the support functions assigned to him or her by the maintenance supervisor. The support shop normally includes the toolroom and shops described in the following paragraphs. All of these shops perform their services to support the heavy and automotive repair shops, which have the basic maintenance responsibility for all civil engineer support equipment (CESE) assigned to the battalion. Requests for support services (machine shop, steel shop, and so forth) from other companies within the battalion will be routed through the maintenance supervisor.

MR Shop

Machinery Repairmen (MRs) are assigned to operate the machine shop trailer, which contains lathes, drill presses, grinders, and other machine tools. It should be located near the repair shops to make it convenient for the crews of both shops to work together on joint projects. The MRs are capable of manufacturing or repairing equipment parts, tools, and machine parts. Valid inventory lists for the MR trailer may be obtained from COMCBPAC equipment office or COMCB-LANT DET, Gulfport.

Electrical Shop

Manned by Construction Mechanics, the electrical shop repairs, rebuilds, cleans, adjusts, and tests all automotive electrical parts and accessories, such as generators, starters, and voltage regulators. In many battalions, Construction Electricians (CEs) are assigned to conduct load tests and make electrical repairs to light plants, generators, and welders.

Battery Shop

CMs assigned to the battery shop maintain and recharge wet cell batteries, mix electrolyte, and keep a supply of fully charged, spare batteries for equipment used by the battalion.

The battery shop should be well separated from any open flames. It must be well ventilated to prevent accumulation of explosive hydrogen gas fumes given off during battery charging. Adequate safety equipment, located within the battery shop, includes rubber aprons and gloves, face shields, eyewash, and treadle shower. Electrical light fixtures and plug-in connections should be of explosiveproof design.

Mechanics' Toolroom

The mechanics' toolroom is the central point for issue of all mechanics' tools under an approved custody control system. Each shop supervisor is the custodian of kits and tools needed continuously for the shop. These are checked out by mechanics of the shop on signed custody receipts. Tools needed to perform particular job assignments are signed out on an individual basis. The toolroom petty officer will have an updated copy of the CESO Sets Kits and Outfits Book (SKO) to provide accurate inventory lists of all tool kits by NAVFAC assembly number. A partial listing of tool kits available to the mechanic stationed in an NMCB follows.

NAVFAC Assembly Number	Kit Name
80012	Tire service tools
80013	Mechanics' hand tools, for two people
80015	Battery service tools
80016	Automotive tune-up
80017	Automotive body tools
80023	Radiator tools
80031	Metric hand tools
80072	Puller set mechanical, 13 ton
80081	Diesel engine test kit
80414	ALFA Company toolroom kit

Be sure to check your toolroom SKO for additional tool kits and their applications. Toolroom personnel perform tool repair within their capabilities and ensure that preventive maintenance service and electrical safety checks (according to COMCBPAC/COMCBLANTINST 5100.1 series, art. 215) are conducted by battalion toolroom personnel.

ALFA Company Steel Shop

In construction battalions, Steelworkers (SWs) and Hull Technicians (HTs) form the nucleus of the ALFA Company steel shop. Their work includes repair and rebuilding of chassis components and body parts; repair and testing of radiators; and repair of any other metal components by welding, soldering, brazing, and so on.

Tire Shop

Personnel assigned to the tire shop repair and replace pneumatic tires on CESE assigned to the battalion.

This shop should be located in an easily accessible area, as over 90 percent of the CESE assigned to a construction battalion uses pneumatic tires. The SKO, volume 2, kit 80012, lists items required to operate a battalion-size tire shop. An air compressor, separate from the maintenance shop, is required because of the large volume of air used.

Lubrication Rack

The mechanics assigned to the lubrication racks maintain adequate stocks of all lubricants required by the battalion and lubricate automotive and construction equipment as required under the preventive maintenance (PM) program.

Although you will have skid-mounted lubricators and lubricating teams for servicing equipment in the field, most of your scheduled PMs will be accomplished in the maintenance shop area. Outdoor locations for lubrication stalls are satisfactory in temperate climates and during favorable weather, but efficiency is increased by providing suitable shelter. PM racks should include provisions for storage of greases and oils, preferably at a distance from your other shop areas, as a precaution against fire.

In addition to facilitating lubrication services, these racks should provide for easier inspection and cleaning of underneath parts and surfaces of CESE.

COST CONTROL SUPERVISOR

At main body sites and large detachment sites, the person assigned as cost control supervisor is normally a CM1. The duties of this supervisor include monitoring the PM clerk, cost control clerk, and direct turnover parts (DTO) clerk. When necessary, he or she will keep the vehicle status boards current, act as liaison to detachments, and keep the maintenance supervisor up to date on any incoming and outgoing action correspondence. The cost control supervisor may also be responsible for updating the equipment computer program for the maintenance supervisor. It is essential that there be a highly reliable person in this job.

Preventive Maintenance Clerk

The PM clerk is responsible for completing the basic information on the Equipment Repair Order (ERO) (figs. 2-1, 2-2, and 2-3), maintaining the Equipment Repair Order Log Sheet (fig. 2-4) and the PM Record Card (figs. 2-5 and 2-6), preparing the annual PM Schedule (fig. 2-7) and the Equipment Repair Order Worksheet (fig. 2-8), and ordinarily also notifying the dispatcher in advance of equipment due into the shop and keeping status boards current as to units in the shop.

Cost Control Clerk

Cost control in any NCF unit consists of accurate reporting of all costs, downtime, and other maintenance data that relates to CESE repairs. The cost control clerk is responsible for summarizing the total cost of repair parts and labor expended and of making these entries in the appropriate ERO blocks.

EQUIPMENT REPAIR ORDER (ERO)
NAVFAC 11200/41 (Rev 10 75)

4813Ø87	485ØØ1	N55ØØØ	PMG1	CB400	Ø2	2617	AAØØØØØ1

	A DIRECT LABOR	B INSPECTION	C INDIRECT LABOR	D MATERIAL	E TOTALS
ESTIMATED HOURS					
ACTUAL HOURS	12.2	1.Ø	.2		Ø,Ø,Ø,Ø,1,4
ESTIMATED COST					
ACTUAL COST (WHOLE $)				188	

	TIME	JULIAN DATE
A EQPT AVAILABLE	1,1,Ø,Ø	7,8,3,Ø,8
B INSPECTION START	1,3,1,5	7,8,3,Ø,8
C SHOP START	1,4,1,5	7,8,3,Ø,8
D STOP FOR PARTS	Ø,9,3,Ø	7,8,3,1,Ø
E PARTS AVAILABLE	1,Ø,Ø,Ø	7,8,3,2,1
F STOP FOR PARTS		
G PARTS AVAILABLE		
H COMPLETED	Ø,8,3,Ø	7,8,3,2,2

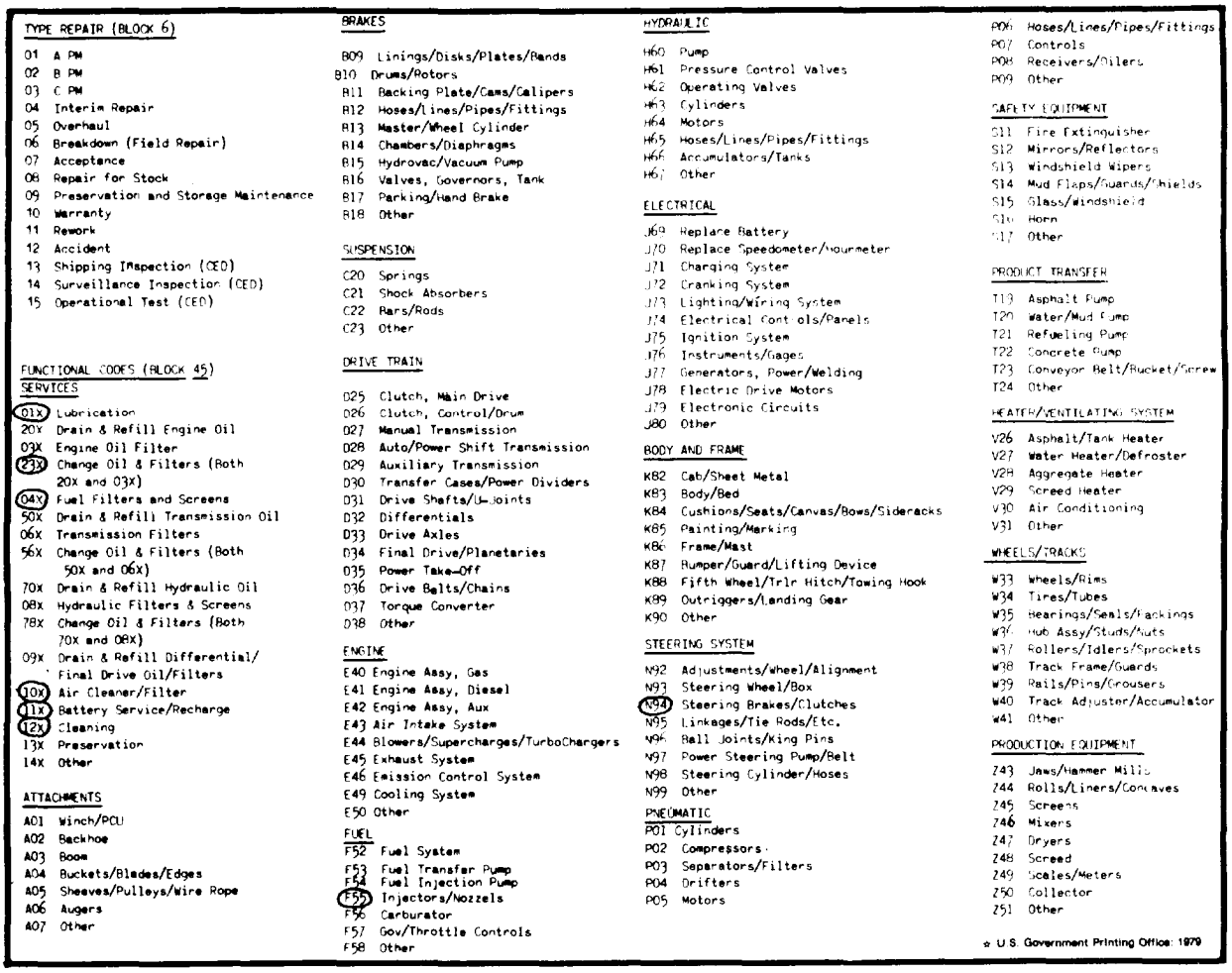
MAKE: IHC
MODEL: TD2ØB
YR: 7 2
LAST PM DATE: B 5 6 7 8
DESCRIPTION: TRACTOR CRAWLER

W/C	FUNCTION CODE	WORK DESCRIPTION (MECHANIC NOTIFY SUPERVISOR OF ALL ADDITIONAL WORK)	PRI/SEC	MANHOURS ACTUAL	MANHOURS ESTIMATE	ESTIMATED MAT'L COST	MECH INITIALS
	1,2,X	Steam Clean		4.0			
	2,3,X	Change Oil and Filters		1.0			
	Ø,1,X	Lube Complete		1.0			
	Ø,4,X	Change Fuel Filters		.5			
	1,1,X	Clean and Service Batteries		.6			
	1,Ø,X	Service Air Cleaners		.3			
		Replace Rain Cap			on order		
	F,5,5	Replace #6 Fuel Injector		1.8			
	N,9,4	Adjust R/H Steering Brake		3.0			
		SUB TOTALS		12.2			

RECEIPT OF ABOVE ORDER AND EQUIPMENT IS HEREBY ACKNOWLEDGED

PERMISSION TO EXCEED WORK ON ERO MUST BE AUTHORIZED BY REQUESTING ACTIVITY

Figure 2-1.—Equipment Repair Order (ERO), NAVFAC 11200/41.



TYPE REPAIR (BLOCK 6)

01 A PM
02 B PM
03 C PM
04 Interim Repair
05 Overhaul
06 Breakdown (Field Repair)
07 Acceptance
08 Repair for Stock
09 Preservation and Storage Maintenance
10 Warranty
11 Rework
12 Accident
13 Shipping Inspection (CED)
14 Surveillance Inspection (CED)
15 Operational Test (CED)

FUNCTIONAL CODES (BLOCK 45)

SERVICES

01X Lubrication
20X Drain & Refill Engine Oil
03X Engine Oil Filter
23X Change Oil & Filters (Both 20X and 03X)
04X Fuel Filters and Screens
50X Drain & Refill Transmission Oil
06X Transmission Filters
56X Change Oil & Filters (Both 50X and 06X)
70X Drain & Refill Hydraulic Oil
08X Hydraulic Filters & Screens
78X Change Oil & Filters (Both 70X and 08X)
09X Drain & Refill Differential/Final Drive Oil/Filters
10X Air Cleaner/Filter
11X Battery Service/Recharge
12X Cleaning
13X Preservation
14X Other

ATTACHMENTS

A01 Winch/PCU
A02 Backhoe
A03 Boom
A04 Buckets/Blades/Edges
A05 Sheaves/Pulleys/Wire Rope
A06 Augers
A07 Other

BRAKES

B09 Linings/Disks/Plates/Bands
B10 Drums/Rotors
B11 Backing Plate/Cams/Calipers
B12 Hoses/Lines/Pipes/Fittings
B13 Master/Wheel Cylinder
B14 Chambers/Diaphragms
B15 Hydrovac/Vacuum Pump
B16 Valves, Governors, Tank
B17 Parking/Hand Brake
B18 Other

SUSPENSION

C20 Springs
C21 Shock Absorbers
C22 Bars/Rods
C23 Other

DRIVE TRAIN

D25 Clutch, Main Drive
D26 Clutch, Control/Drum
D27 Manual Transmission
D28 Auto/Power Shift Transmission
D29 Auxiliary Transmission
D30 Transfer Cases/Power Dividers
D31 Drive Shafts/U-Joints
D32 Differentials
D33 Drive Axles
D34 Final Drive/Planetaries
D35 Power Take-Off
D36 Drive Belts/Chains
D37 Torque Converter
D38 Other

ENGINE

E40 Engine Assy, Gas
E41 Engine Assy, Diesel
E42 Engine Assy, Aux
E43 Air Intake System
E44 Blowers/Superchargers/TurboChargers
E45 Exhaust System
E46 Emission Control System
E49 Cooling System
E50 Other

FUEL

F52 Fuel System
F53 Fuel Transfer Pump
F54 Fuel Injection Pump
F55 Injectors/Nozzels
F56 Carburator
F57 Gov/Throttle Controls
F58 Other

HYDRAULIC

H60 Pump
H61 Pressure Control Valves
H62 Operating Valves
H63 Cylinders
H64 Motors
H65 Hoses/Lines/Pipes/Fittings
H66 Accumulators/Tanks
H67 Other

ELECTRICAL

J69 Replace Battery
J70 Replace Speedometer/Hourmeter
J71 Charging System
J72 Cranking System
J73 Lighting/Wiring System
J74 Electrical Controls/Panels
J75 Ignition System
J76 Instruments/Gages
J77 Generators, Power/Welding
J78 Electric Drive Motors
J79 Electronic Circuits
J80 Other

BODY AND FRAME

K82 Cab/Sheet Metal
K83 Body/Bed
K84 Cushions/Seats/Canvas/Bows/Sideracks
K85 Painting/Marking
K86 Frame/Mast
K87 Bumper/Guard/Lifting Device
K88 Fifth Wheel/Trlr Hitch/Towing Hook
K89 Outriggers/Landing Gear
K90 Other

STEERING SYSTEM

N92 Adjustments/Wheel/Alignment
N93 Steering Wheel/Box
N94 Steering Brakes/Clutches
N95 Linkages/Tie Rods/Etc.
N96 Ball Joints/King Pins
N97 Power Steering Pump/Belt
N98 Steering Cylinder/Hoses
N99 Other

PNEUMATIC

P01 Cylinders
P02 Compressors
P03 Separators/Filters
P04 Drifters
P05 Motors
P06 Hoses/Lines/Pipes/Fittings
P07 Controls
P08 Receivers/Oilers
P09 Other

SAFETY EQUIPMENT

S11 Fire Extinguisher
S12 Mirrors/Reflectors
S13 Windshield Wipers
S14 Mud Flaps/Guards/Shields
S15 Glass/Windshield
S16 Horn
S17 Other

PRODUCT TRANSFER

T19 Asphalt Pump
T20 Water/Mud Pump
T21 Refueling Pump
T22 Concrete Pump
T23 Conveyor Belt/Bucket/Screw
T24 Other

HEATER/VENTILATING SYSTEM

V26 Asphalt/Tank Heater
V27 Water Heater/Defroster
V28 Aggregate Heater
V29 Screed Heater
V30 Air Conditioning
V31 Other

WHEELS/TRACKS

W33 Wheels/Rims
W34 Tires/Tubes
W35 Hearings/Seals/Packings
W36 Hub Assy/Studs/Nuts
W37 Rollers/Idlers/Sprockets
W38 Track Frame/Guards
W39 Rails/Pins/Grousers
W40 Track Adjuster/Accumulator
W41 Other

PRODUCTION EQUIPMENT

Z43 Jaws/Hammer Mills
Z44 Rolls/Liners/Concaves
Z45 Screens
Z46 Mixers
Z47 Dryers
Z48 Screed
Z49 Scales/Meters
Z50 Collector
Z51 Other

☆ U.S. Government Printing Office: 1979

Figure 2-2.—Equipment Repair Order (ERO), NAVFAC 11200/41 (back).

Direct Turnover Parts (DTO) Clerk

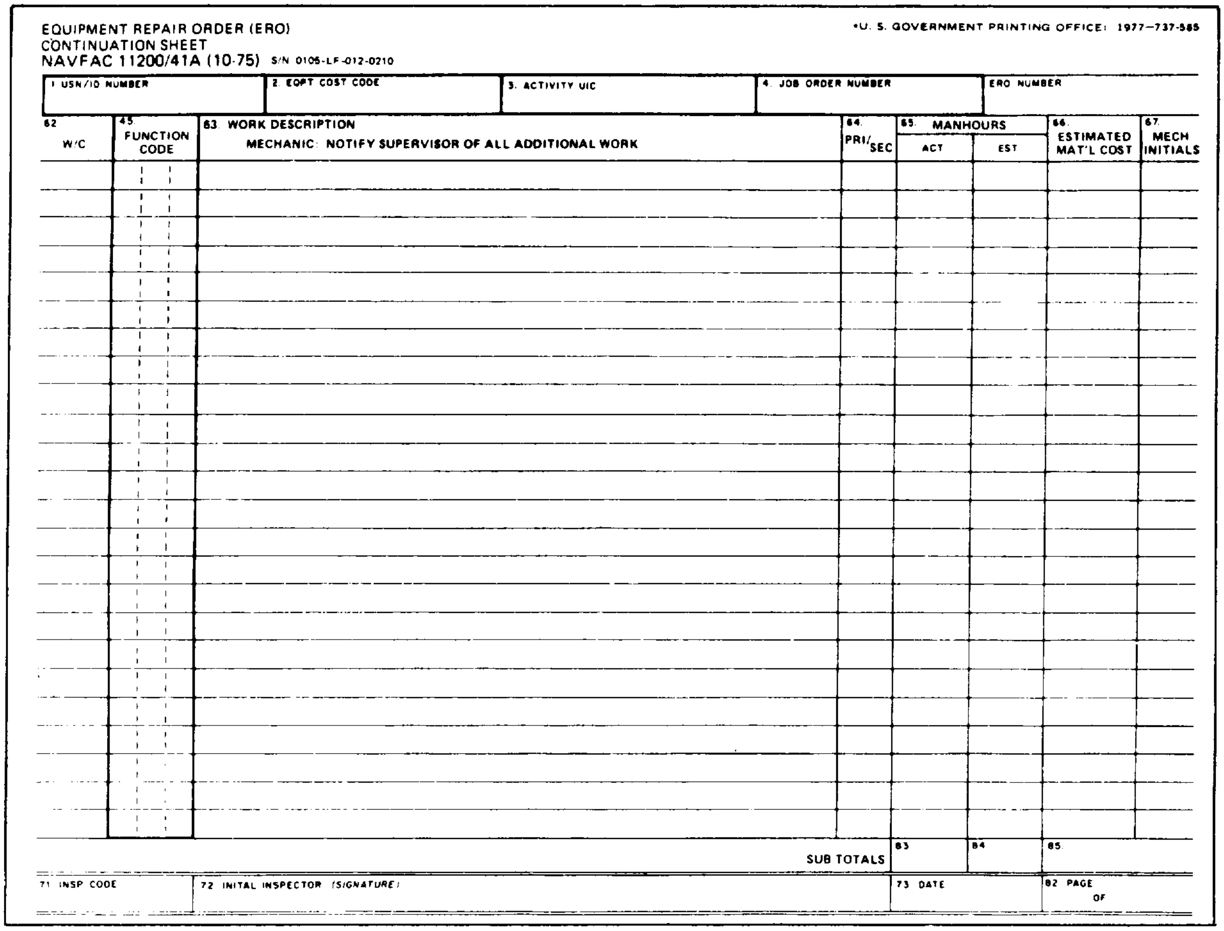
All requisitions for not in stock (NIS) and not carried (NC) material must pass through the DTO clerk. The individual assigned as DTO clerk will maintain the DTO Log (fig. 2-9), Repair Parts Summary Sheets (fig. 2-10), deadline file, and deadline status board. The DTO clerk is also responsible for receipt and turn-in of DTO repair parts and for maintaining the DTO parts storage room.

TECHNICAL LIBRARIAN

The technical librarian is responsible for all of the CESE maintenance, parts, and operators' manuals assigned to the NCF unit. The librarian works according to COMCBPAC/COMCB-LANTINST 5600.1 series in establishing the inventory and enforcing check-out procedures, Replacement manuals for older CESE are normally expensive and hard to obtain. Without these publications, CESE cannot be properly maintained, repaired, or operated, and the unit is largely "dead in the water." The technical librarian maintains all required reference materials, such as microfiche, COSAL, and so forth, needed to research and initiate parts requisitions. The technical librarian normally researches and prepares parts requisitions to free the floor mechanic to perform maintenance functions.

BATTALION MAINTENANCE PROGRAM

The purpose of the battalion maintenance program is to keep CESE in a constant safe and


EQUIPMENT REPAIR ORDER (ERO)
CONTINUATION SHEET
NAVFAC 11200/41A (10-75) S/N 0105-LF-012-0210
*U. S. GOVERNMENT PRINTING OFFICE: 1977—737-585

1 USN/ID NUMBER | 2 EQPT COST CODE | 3. ACTIVITY UIC | 4. JOB ORDER NUMBER | ERO NUMBER

62 W/C | 45 FUNCTION CODE | 63 WORK DESCRIPTION MECHANIC: NOTIFY SUPERVISOR OF ALL ADDITIONAL WORK | 64. PRI/SEC | 65. MANHOURS ACT EST | 66. ESTIMATED MAT'L COST | 67. MECH INITIALS

SUB TOTALS 83 84 85

71 INSP CODE | 72 INITAL INSPECTOR (SIGNATURE) | 73 DATE | 82 PAGE OF

Figure 2-3.—Equipment Repair Order Continuation Sheet, NAVFAC 11200/41A.

serviceable condition at a minimum cost and to detect and correct minor deficiencies before they lead to costly repairs. The CESE Maintenance System of the NCF and special operating units (SOU) has three categories of maintenance: (1) organizational, (2) intermediate, and (3) depot.

ORGANIZATIONAL MAINTENANCE

The first, or organizational, level of maintenance is divided into two categories: operator maintenance and preventive maintenance (PM). Operator maintenance, sometimes called first-echelon maintenance, is the maintenance that every operator is required to do to maintain CESE in a clean, safe, and serviceable condition. It includes daily inspections, lubrications, and adjustments necessary to ensure early detection of malfunctions of CESE. Figures 2-11 and 2-12 show preventive maintenance forms that the operator can use as guides for a daily prestart inspection and as a trouble report in case of any defect or unsafe condition that needs to be reported to the dispatcher immediately.

The second part of organizational maintenance is preventive maintenance, which goes beyond the inspections, lubrications, and adjustments of operator maintenance. Its prime objective is to maximize equipment availability and to minimize unnecessary repair costs. Whenever feasible, operators should participate in this type of maintenance.

INTERMEDIATE MAINTENANCE

Intermediate maintenance, which every shop has the responsibility to perform, encompasses the removal, replacement, repair, alteration, calibration, modification, rebuilding, and overhaul of assemblies, subassemblies, and components. Although the rebuild and overhaul of major assemblies are included, only essential

ERO NUMBER	CODE	USN NUMBER	TYPE ERO				DATE IN	DATE OUT	REMARKS
			INT	A	B	C			
AA00 0001	252021	25-01286	X				11/2/8	11/8/8	
AA00 0002	030701	97-23465		X			11/2/8	11/2/8	
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---	---	---	--	--	--	--	---	---	--
---	---	---	--	--	--	--	---	---	--
AA00 0013	485011	48-00123	X		X		11/28/8	12/12/8	D/L 12/1/8

ERO NUMBER - Eight-digit number. The first four digits of the ERO number will be two Alpha characters and two numeric such as AA00. The second group will be all numeric and will run continuously from 0001 through 9999 with no regard to end of fiscal year.

CODE - Self-explanatory. (Six Digit)

USN NUMBER - Self explanatory.

TYPE ERO - Type maintenance performed: interim repair. A,B, or C-PM.

DATE IN (SHOP) - Date ERO forwarded to inspector.

DATE OUT (SHOP) - Date ERO returned. Work completed.

REMARKS - Date deadlined etc.

Figure 2-4.—Equipment Repair Order Log Sheet.

ASSIGNED TO: NMCB ____ | PHONE: | TYPE OF ASSIGNMENT: ____ | EQUIP CODE: 423001 | JOB ORDER NO.: ____ | PM GROUP: 13

NAME: BUCYRUS ERIE | MODEL: 30B | TYPE: D | YEAR: 82 | EST. ANNUAL MI/HRS: ____ | USN REG. NO.: 42-03317

TYPE PM	DATE	CUMULATIVE MILEAGE OR HRS. OPN.	MILES (OR HRS) SINCE LAST PM	MILES (OR HRS) REPORTED FOR 6 MO. PERIOD	TYPE PM	DATE	CUMULATIVE MILEAGE OR HRS. OPN.	MILES (OR HRS) SINCE LAST PM	MILES (OR HRS) REPORTED FOR 6 MO. PERIOD
LAST A	2-4-88	1945	ENTRIES TRANSFERRED FROM PRIOR RECORD						
LAST B	6-5-88	2259							
LAST C	4-1-88	2060							
07	6-1-88	2100							
01	7-26-88	2156							
01	9-21-88	2340							
02	11-16-88	2510	O/C,F/C,FF/C,HF,C						

VEHICLE/CONSTRUCTION EQUIPMENT PM RECORD NAVFAC 11240/6 (2 75) *Supersedes NAVDOCKS 1949*

Figure 2-5.—PM Record Card, NAVFAC 11240/6.

TYPE PM	DATE	CUMULATIVE MILEAGE OR HRS OPN	MILES (OR HRS) SINCE LAST PM	MILES (OR HRS) REPORTED FOR 6 MO PERIOD	TYPE PM	DATE	CUMULATIVE MILEAGE OR HRS OPN	MILES (OR HRS) SINCE LAST PM	MILES (OR HRS) REPORTED FOR 6 MO PERIOD
					A14000		FAIRLEAD	1	
					A04000		BOOM TIP	1	
					A03500		BOOM JIB	1	
					A02500		BOOM BUTT	1	
					A11500		CRANE HOOK	1	
					A03000		BOOM EXT	3	
					A23500		TAG LINE	1	

NAVFAC 11240/6 (2 75) BACK

Figure 2-6.—PM Record Card, NAVFAC 11240 /6 (back).

repairs shall be accomplished to ensure safe and serviceable equipment. Intermediate maintenance requires a higher degree of skill than organizational maintenance, a larger assortment of repair parts, more precision tools, and more complex testing equipment. Prior approval is required by COMCBPAC, COMCBLANT, or CESO before purchasing expensive parts or components for any CESE requiring extensive repairs or numerous assembly rebuilds. For further guidance see COMCBPAC/COMCBLANTINST 11200.1 series, section 2, paragraph 3201.

DEPOT MAINTENANCE

The third level of maintenance is depot maintenance. This is performed on equipment that requires major overhaul or restoration to the degree necessary to restore the unit to a like-new condition. This level of maintenance is not normally performed by field units, NMCBs, ACBs, and the like. Depot maintenance is performed by designated overhaul facilities, such as construction equipment departments located at CBC Port Hueneme, California, CBC Gulfport, Mississippi, and CBC Davisville, Rhode Island.

SCHEDULING MAINTENANCE

The standard interval between preventive maintenance service inspections for NCF CESE is 40 working days. This interval is established initially by grouping all assigned CESE into 40 separate PM groups. The CESE is distributed evenly among the PM groups so that only the minimum number of similar units is out of service at any one time.

It is the responsibility of the maintenance supervisor to determine whether the PM interval for any unit of CESE should be reduced. To maintain reliability, increased working tempo demands increased preventive maintenance. The maintenance supervisor may decrease the interval by assigning specific CESE to more than one PM group or reducing the total number of PM groups. The maintenance supervisor is not authorized to extend the standard interval between PM service inspections beyond 40 working days.

To establish a deployment schedule of PM due dates, the maintenance supervisor records the working days of the month consecutively beside the PM group numbers. See the sample schedule, figure 2-7.

ACTIVITY _____

YEAR _____

PM SCHEDULE GROUP	MONTH AND DAY SCHEDULE											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	21		19		14		11		6		1	
2	22		20		15		12		9		4	
3	23		21		16		15		10		5	
4	24		22		17		16		11		6	
5	25		25		20		17		12		7	
6	28		26		21		18		13		8	
7	29		27		22		19		16		12	
8	30		28		23		22		17		13	
9	31		29		24		23		18		14	
10		1		1	27		24		19		15	
11		4		2	28		25		20		18	
12		5		3	29		26		23		20	
13		6		4	31		29		24		21	
14		7		5		3	30		25		22	
15		8		8		4	31		26		25	
16		11		9		5		1	27		26	
17		12		10		6		2	30		27	
18		13		11		7		5		1	29	
19		14		12		10		6		2		2
20		15		15		11		7		3		3
21		18		16		12		8		4		4
22		19		17		13		9		7		5
23		20		18		14		12		8		6
24		21		19		17		13		9		9
25		25		22		18		14		10		10
26		26		23		19		15		11		11
27		27		24		20		16		14		12
28	2	28		25		21		19		15		13
29	3		1	26		24		20		16		16
30	4		4	29		25		21		17		17
31	7		5	30		26		23		18		18
32	8		6		1	27		26		21		19
33	9		7		2	28		27		22		20
34	10		8		3		1	28		23		21
35	11		11		6		2	29		24		24
36	14		12		7		3	30		25		26
37	15		13		8		5			28		27
38	16		14		9		8		3	29		30
39	17		15		10		9		4	30		31
40	18		18		13		10		5	31		

Figure 2-7.—PM Schedule.

A PM Record Card (fig. 2-5) is maintained for each item of assigned CESE to help the PM clerk prepare the ERO. The following information is taken from the completed ERO and entered on a PM Record Card:

Type of service performed

Date performed

Cumulative mileage/hours

Whether oil or filter was changed (shown by the abbreviation O/C or F/C)

PM record cards are maintained by the PM group in a tickler file, which the maintenance supervisor reviews at least once a month. When a vehicle is transferred, the PM Record Cards that pertain to that vehicle are placed in the history jacket.

The reverse side of the PM Record Card (fig. 2-6) is convenient for listing attachments for each USN. This will aid the inspector in locating the proper attachments for PM.

EQUIPMENT REPAIR ORDER (ERO) WORKSHEET

NAVFAC 11200/41B (4-79)

PAGE 1 OF 2

1 USN/ID NUMBER	2 EQPT COST CODE	3 ACTIVITY UIC	4 JOB ORDER NUMBER	5 LOCATION/ALLOWANCE	6 TYPE REPAIR	7 HR METER READING	8 MILE METER READING	9 ERO NUMBER
4813087	48501							AA00001

10 CUSTOMER	11 WORK CENTER	12 DESCRIPTION	13 YEAR	14 MAKE	15 MODEL	16 APL NUMBER
						95009518

17 ENGINE MANUFACTURER	18 ENGINE MODEL	19 ENGINE SERIAL NUMBER	20 CHASSIS SERIAL NUMBER

21 NSN	22 FSCM	23 MANUFACTURER PART NUMBER	24 DESCRIPTION	25 QTY	26 UI	27 UNIT COST	28 DOCUMENT NUMBER (LAST 6 DIGITS)	29 RCVD
2910-00-555-1234	31007	165437R91	Injector Line #6	1	EA	8.50		

30 APPROVED BY (SIGNATURE) A. B. Sea CMI

31 DATE 7/8/91

Figure 2-8.-Equipment Repair Oder Worksheet. NAVFAC 11200/41B.

DIRECT TURNOVER LOG (DTO)

DATE	DEPT.	ENG	USN NUMBER	NSN-P/N	ITEM	UNIT PRICE	QTY	PRI	NC/ NIS	REQ. NO.	FOLLOW-UP	REC'D	ISSUED & INITIAL

Figure 2-9.—Direct Turnover (DTO) Log.

The types of PM inspection are defined and given as follows:

Type A Inspections

This type of inspection is given at intervals of 40 working days, using the appropriate PM service and inspection guide. They are performed on scheduled PM due dates. After having received two Type A PMs, the vehicle qualifies for a Type B inspection.

Type B Inspections

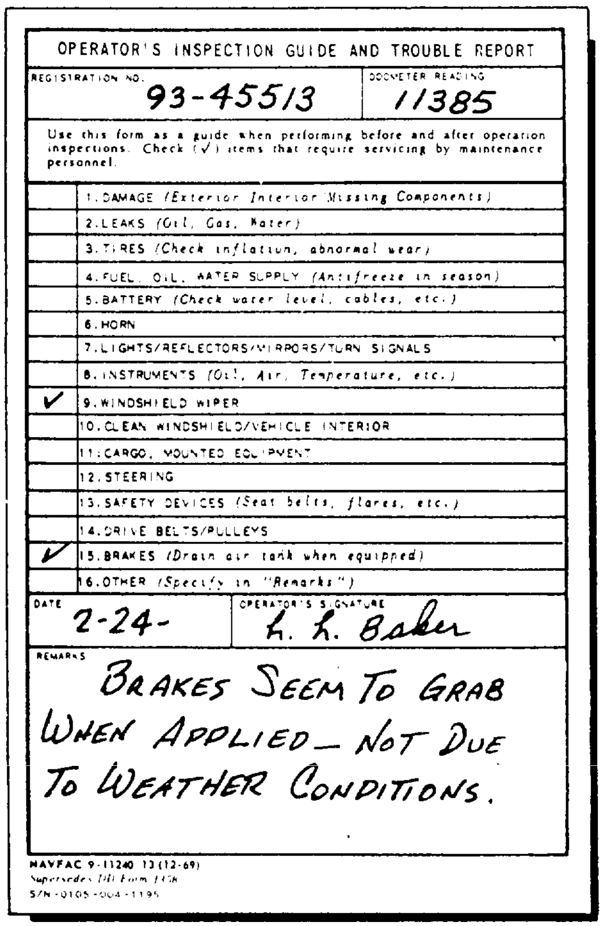
The Type B PM inspection is performed after two consecutive Type A inspections, using the appropriate PM service and inspection guide.

REPAIR PARTS SUMMARY SHEET

PM Group 23
Code 485001 USN 48-00123

Date	Dept. No	UND	Req No.	Nomenclature	Follow-up	Rec'd
8018	A009	B	8021-2211	Gasket Set	1/31	2/28
8229	A161	B	8230-2713	Injector	8/28 9/15 10/2	10/11
8246	A218	B		Raincap		

Figure 2-10.—Repair Parts Summary Sheet Sample



OPERATOR'S INSPECTION GUIDE AND TROUBLE REPORT

REGISTRATION NO. 93-45513

ODOMETER READING 11385

Use this form as a guide when performing before and after operation inspections. Check (✓) items that require servicing by maintenance personnel.

	1. DAMAGE *(Exterior Interior Missing Components)*
	2. LEAKS *(Oil, Gas, Water)*
	3. TIRES *(Check inflation, abnormal wear)*
	4. FUEL, OIL, WATER SUPPLY *(Antifreeze in season)*
	5. BATTERY *(Check water level, cables, etc.)*
	6. HORN
	7. LIGHTS/REFLECTORS/MIRRORS/TURN SIGNALS
	8. INSTRUMENTS *(Oil, Air, Temperature, etc.)*
✓	9. WINDSHIELD WIPER
	10. CLEAN WINDSHIELD/VEHICLE INTERIOR
	11. CARGO, MOUNTED EQUIPMENT
	12. STEERING
	13. SAFETY DEVICES *(Seat belts, flares, etc.)*
	14. DRIVE BELTS/PULLEYS
✓	15. BRAKES *(Drain air tank when equipped)*
	16. OTHER *(Specify in "Remarks")*

DATE 2-24-

OPERATOR'S SIGNATURE L. L. Baker

REMARKS

BRAKES SEEM TO GRAB WHEN APPLIED — NOT DUE TO WEATHER CONDITIONS.

NAVFAC 9-11240 13 (12-69)
Supersedes DD Form 1358
S/N-0105-004-1195

Figure 2-11.—Operator's Inspection Guide and Trouble Report, NAVFAC 9-11240/13.

Type C Inspections

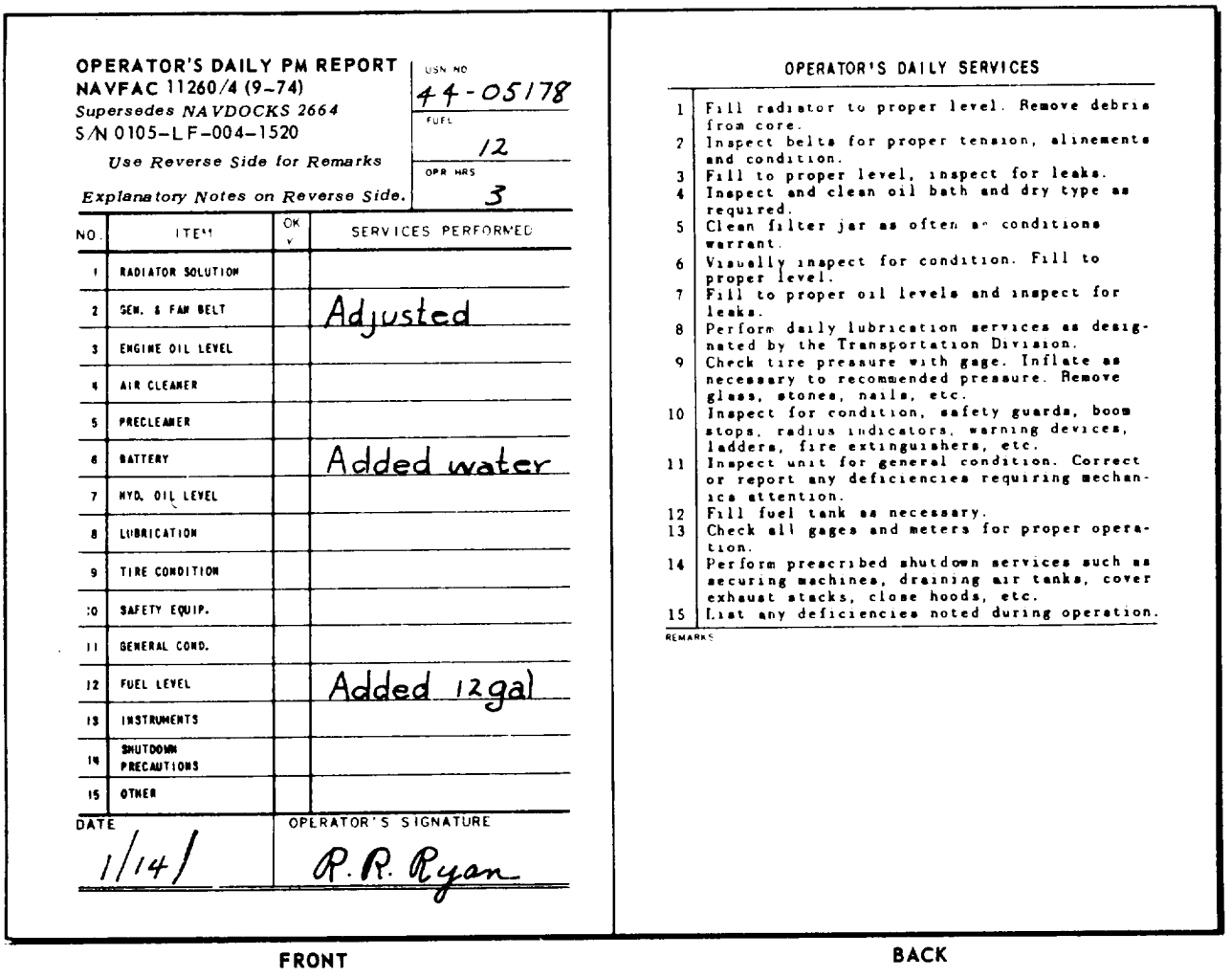
Consult COMCBPAC/COMCBLANTINST 11200.1 series for guidance regarding frequency of Type C PM scheduling.

NOTE

Cost and availability of repair parts, as well as resources and working conditions, must be considered along with CESE commitments and conditions.

EQUIPMENT REPAIR ORDER AND CONTINUATION SHEET

The Equipment Repair Order (ERO) (figs. 2-1 and 2-2) and the continuation sheet (fig. 2-3) are used in the NCF to record costs of repairs, hours required for repairs, and total time that equipment is out of service. The data will help the NCF in budget planning, determining life expectancies of equipment, and predicting future equipment and training requirements. The Naval Facilities Engineering Command Systems Office (FACSO), Port Hueneme, California, also uses the data to compile cost and utilization figures on each piece of USN-numbered equipment. Therefore, the data must be complete, accurate, and neatly recorded according to NAVFAC P-404 and COMCBPAC/COMCBLANTINST 11200 series.



OPERATOR'S DAILY PM REPORT
NAVFAC 11260/4 (9-74)
Supersedes NAVDOCKS 2664
S/N 0105-LF-004-1520
Use Reverse Side for Remarks
Explanatory Notes on Reverse Side.

USN NO 44-05178
FUEL 12
OPR HRS 3

NO.	ITEM	OK ✓	SERVICES PERFORMED
1	RADIATOR SOLUTION		
2	GEN. & FAN BELT		Adjusted
3	ENGINE OIL LEVEL		
4	AIR CLEANER		
5	PRECLEANER		
6	BATTERY		Added water
7	HYD. OIL LEVEL		
8	LUBRICATION		
9	TIRE CONDITION		
10	SAFETY EQUIP.		
11	GENERAL COND.		
12	FUEL LEVEL		Added 12gal
13	INSTRUMENTS		
14	SHUTDOWN PRECAUTIONS		
15	OTHER		

DATE 1/14/ OPERATOR'S SIGNATURE R. R. Ryan

FRONT

OPERATOR'S DAILY SERVICES

1. Fill radiator to proper level. Remove debris from core.
2. Inspect belts for proper tension, alinements and condition.
3. Fill to proper level, inspect for leaks.
4. Inspect and clean oil bath and dry type as required.
5. Clean filter jar as often as conditions warrant.
6. Visually inspect for condition. Fill to proper level.
7. Fill to proper oil levels and inspect for leaks.
8. Perform daily lubrication services as designated by the Transportation Division.
9. Check tire pressure with gage. Inflate as necessary to recommended pressure. Remove glass, stones, nails, etc.
10. Inspect for condition, safety guards, boom stops, radius indicators, warning devices, ladders, fire extinguishers, etc.
11. Inspect unit for general condition. Correct or report any deficiencies requiring mechanics attention.
12. Fill fuel tank as necessary.
13. Check all gages and meters for proper operation.
14. Perform prescribed shutdown services such as securing machines, draining air tanks, cover exhaust stacks, close hoods, etc.
15. List any deficiencies noted during operation.

REMARKS

BACK

Figure 2-12.—Operator's Daily PM Report, Construction and Allied Equipment, NAVFAC 11260/4.

The Equipment Repair Order Worksheet (fig. 2-8) is used solely to list repair parts used. It is used by the mechanic and shop supervisor to ensure that all supply documents are attached to the ERO. The cost control supervisor and the maintenance supervisor use this form to record the cost of repair parts properly.

The ERO is the sole authority to perform work on equipment, whether the work is performed in the field or in the shop. An ERO is required each time labor time exceeds 1.0 hour or materials are expended on scheduled PM, interim repairs, modernization or alteration of equipment, or deadline cycling or preservation of equipment. The ERO Log Sheet (fig. 2-4) is one means for keeping track of the status of the EROS.

REPAIR PARTS

Any NCF unit has a wide variety of CESE assigned to it. Large quantities of repair parts are required to keep CESE in top operating condition. Because of this, a Construction Mechanic is assigned to supply to work in the repair parts outlet to identify repair parts, to provide counter help, and to act as a warehouseman. He or she also acts as an interface between supply and the maintenance supervisor. The Construction Mechanic assigned to this position is required to attend Shops Stores Procedure Class, given by NCTC Port Hueneme, California, to learn the full scope of his or her responsibilities. (See COMCBPAC/COMCB-LANTINST 4400.3 series for the NCTC SSPC course number.)

COSAL SUPPORT

NAVFAC-funded initial outfitting repair parts allowances required by the NCF for support of its assigned equipment are listed in Consolidated SEABEE Allowance Lists (COSALs). The COSAL establishes the support for assigned organic and augment equipment based on USN-numbered listings. COSALs are published under the authority contained in the NAVFAC/NAVSUP program support agreement by Naval Ships Parts Control Center (SPCC), Mechanicsburg, Pennsylvania. COSALs are both technical and supply documents. They are technical documents in that equipment nomenclature, operating characteristics, technical manuals, and so on, are described in Allowance Parts Lists. They are supply documents in that they list all parts by manufacturer's code and part number, national stock number, unit of issue, and price and quantity authorized by NAVFAC maintenance policy. Repair parts allowances are designed to provide a 90 percent effectiveness for 1,800 construction hours or 90 days support. This 90-day period is defined as a 3-month utilization period for vehicles or equipment in new or like-new condition. Selection of parts included in the COSAL is made after identification; usage and insurance items are coded by maintenance capability according to NAVFAC Lead Allowance Parts Lists. Maintenance codes are used to control the allowed item range for each of the various organizational maintenance capabilities. The definition and application of maintenance codes are contained in appendix C of the COSAL introduction. There are two basic categories of repair parts: parts peculiar—NAVSUP modifier code 98 and parts common—NAVSUP modifier code 97. These are published in two separate COSALs. Parts peculiar are applicable only to specific makes or models of equipment. Parts common are the general repair type of items, (appendix G of the COSAL introduction) and are not referenced to any specific equipment. Military and commercial operators, manuals, parts manuals, and maintenance manuals are listed in the parts peculiar COSAL. A descriptive account showing the method of entry and how to use the COSAL is contained in appendix F of the COSAL instruction.

A third category of repair parts has been added to the battalion's allowance. The NAVSUP modifier 96 is a minimodifier 97 for use with the air detachment or an extended detachment.

SUPPLY AIDS

The following supply aids have been developed and are distributed with each COSAL to assist personnel in the repair parts program:

NAVSUP Form 1114 (fig. 2-13)—Stock Record Card Afloat.

Add Item Listing—Repair parts provided by a Naval Construction Battalion Center (NCBC) to support new equipment not previously supported.

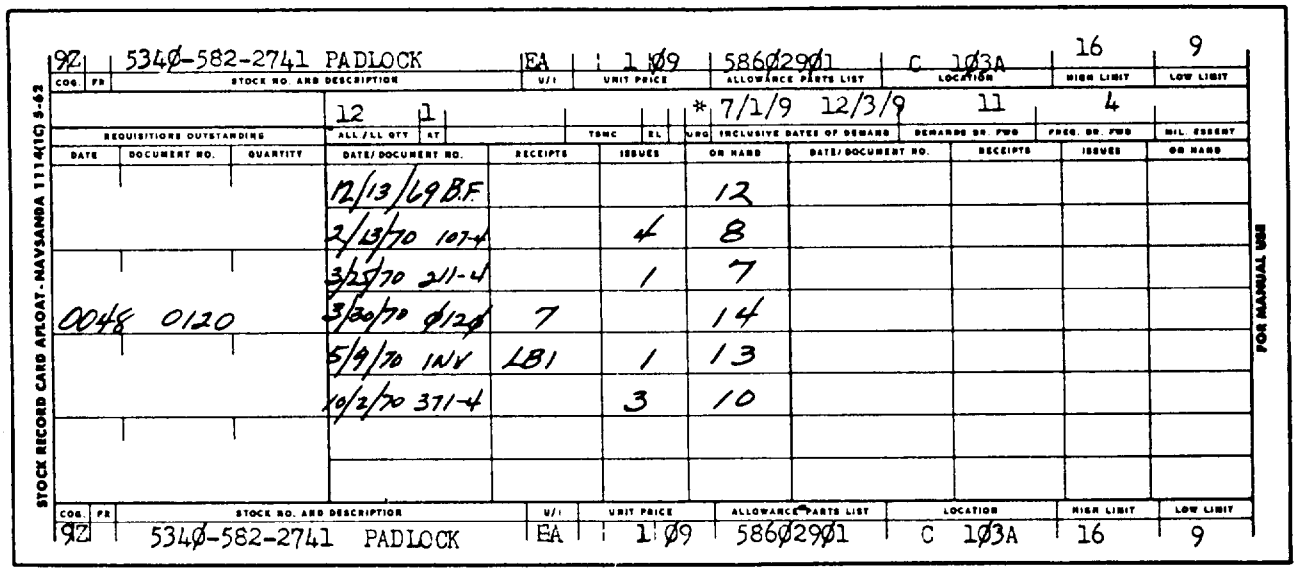


Figure 2-13.—Stock Record Card Afloat, NAVSUP Form 1114.

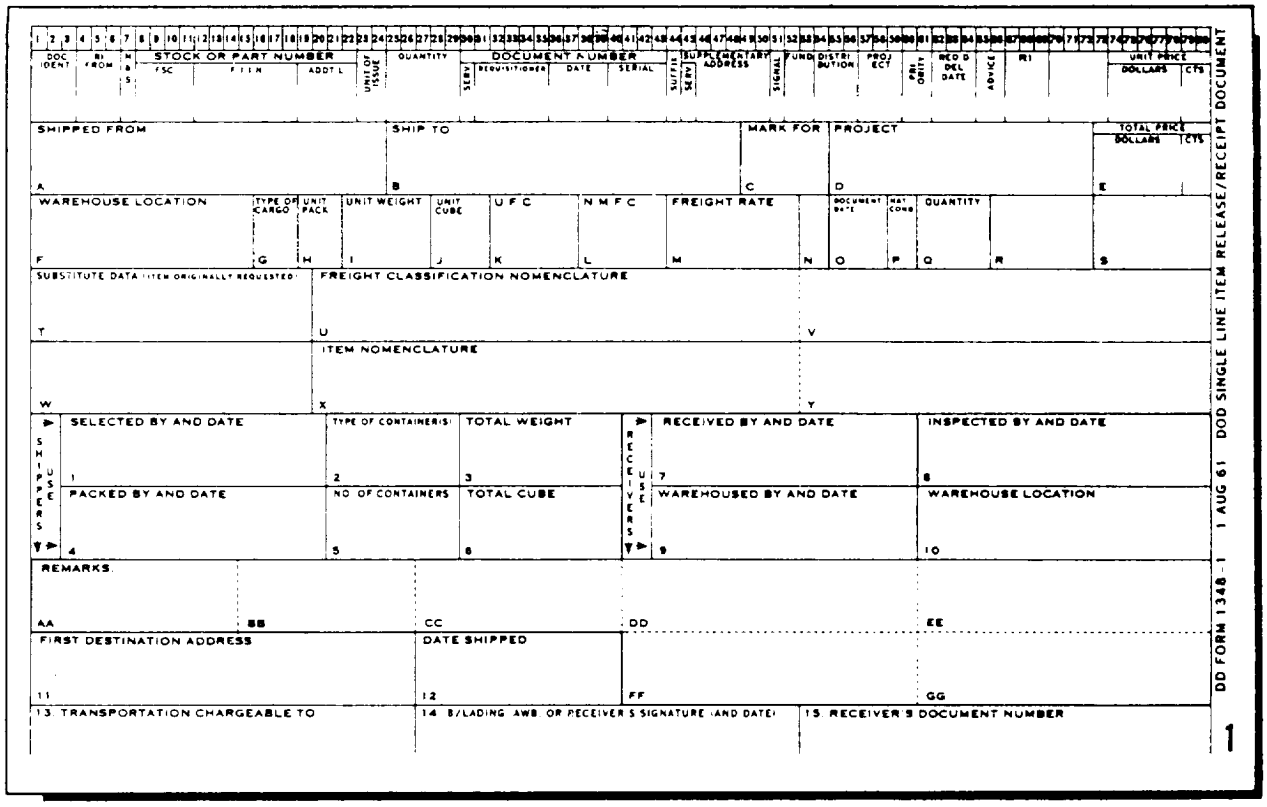


Figure 2-14.—Single-Line Item Release/Receipt Document, DD Form 1348-1.

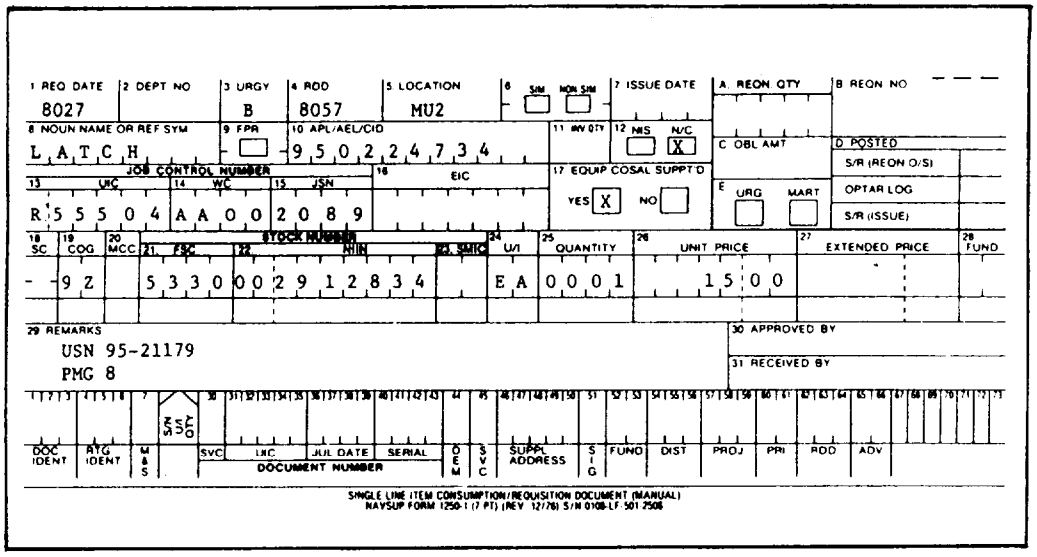


Figure 2-15.—Single-Line Item Consumption/Management Document (Manual), NAVSUP Form 1250-1.

Delete Item Listing—Repair parts provided by a previous COSAL that are no longer required.

DD Form 1348-1 (fig. 2-14)—Single-Line Item Release/Receipt Document.

Transfer Item Listing—A list showing previous COSAL items that must be transferred to other locations because of equipment transfer.

Summary Item List—A composite list of all items required by the old COSAL.

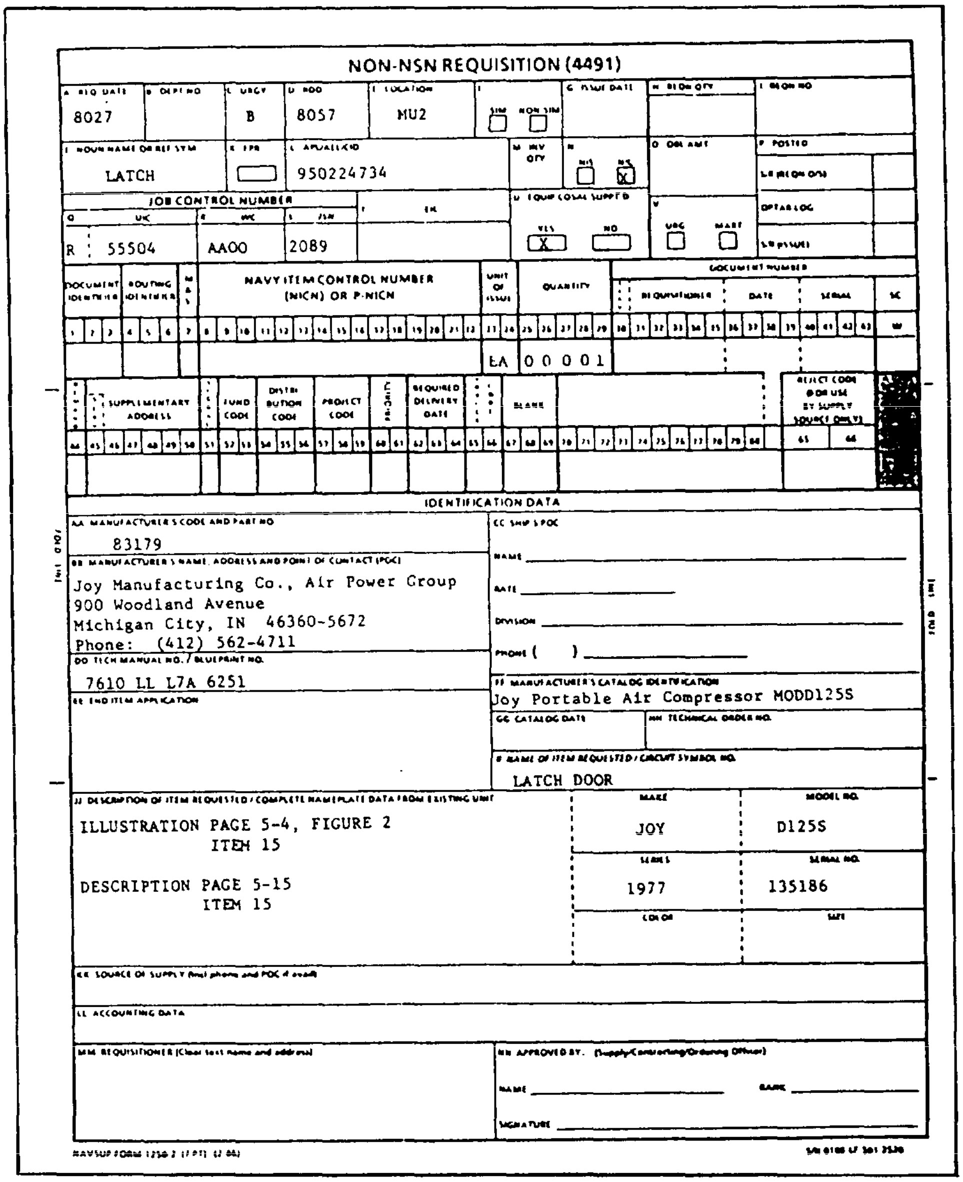
Stock Number Changes—Two listings: old-to-new national stock number (NSN) and new-to-old (NSN) which show changes in the stock number listed in the old COSAL and updated by the new COSAL.

TECHNICAL LIBRARY

An effective CESE management program needs technical data and guides for each item of CESE. Within the NCF, operator manuals, lubrication charts, parts manuals, and shop repair manuals are included in each parts peculiar COSAL. Civil Engineer Support Office (CESO) administers the technical manual support program. Inadequate or deficient TMs are reported to CESO.

REQUESTING REPAIR PARTS

NAVSUP Forms 1250-1 (fig. 2-15) and 1250-2 (fig. 2-16) are used as authorization for drawing


NON-NSN REQUISITION (4491)

8027 B 8057 MU2

LATCH 950224734

R 55504 AA00 2089

EA 00001

IDENTIFICATION DATA

83179

Joy Manufacturing Co., Air Power Group
900 Woodland Avenue
Michigan City, IN 46360-5672
Phone: (412) 562-4711

7610 LL L7A 6251

Joy Portable Air Compressor MODD125S

LATCH DOOR

ILLUSTRATION PAGE 5-4, FIGURE 2
ITEM 15

DESCRIPTION PAGE 5-15
ITEM 15

JOY D125S

1977 135186

Figure 2-16.—NAVSUP Form 1250-2.

or ordering repair parts. The appropriate shop supervisor is responsible for ensuring that they are prepared according to COMCBPAC/COMCB-LANTINST 4400.3 series.

Repair Parts Available from Stock

After the shop supervisor or higher authority authenticates the request, the cost control clerk submits the form to the repair parts storeroom with the ERO, After receiving the required part, the receiver signs NAVSUP Form 1250-1 (fig. 2-1 5) in data block 31. The repair parts person then enters the NSN quantity and price on the ERO worksheet and verifies the issue by initials.

Repair Parts Not in Stock (NIS), Not Carried (NC), or Procured from Salvage or Local Manufacture

If the repair part requested is NIS or NC, the storeroom storekeeper marks an "X" in the appropriate box in data block 12 and verifies data entries.

The request for an NIS/NC repair part will be attached to the ERO and returned to the cost control office for review by the maintenance supervisor and assignment of the urgency-of-need designator. The ERO, with NAVSUP Form 1250-1 or 1250-2 attached, is then passed to the cost control clerk, who records the information in the DTO log and DTO Summary Sheet. The cost control clerk pulls the yellow copy of the ERO and files it with the DTO Parts Summary Sheet. Nonoperational ready supply (NORS)/ anticipated nonoperational ready supply (ANORS) entries in the DTO log are annotated in red ink.

Requests for repair parts with an urgency-of-need designator "B" in data block 3 require the approval signature of the ALFA FOUR or designated assistant in data block 30. All urgency-of-need designator "A" requests require the approval signature of the ALFA SIX.

The supply department orders the NIS/NC repair part and returns the yellow copy of NAVSUP Form 1250-1 or 1250-2 (fig. 2-16) within 72 hours after assigning the Julian date and serial number in data block B (fig. 2-15). The Julian date and serial number, referred to as the requisition number, are entered in the DTO log and will always be used for reference whenever a request is made for the requisition status of an outstanding order.

When any NIS/NC repair part is received, the item is given to the DTO clerk. The DTO clerk notates the part received on the DTO log and the appropriate DTO Summary Sheet. The yellow copy of the NAVSUP 1250-1 or 1250-2 (figs. 2-15 and 2-16) is taken from the file and attached to the part, which is then stored in the DTO bin according to the PM group of the equipment for which it was ordered. Any DTO part received for a deadline piece of equipment must be brought to the attention of the maintenance supervisor for disposition.

Repair parts from salvage or local manufacture (fabrication within the unit) may not involve procurement or issue action through the repair parts storeroom but must be documented for purposes of cost control and historical demand.

NON-NSN Requisition, NAVSUP Form 1250-2 (fig. 2-16), is processed in the same manner as NAVSUP Form 1250-1 (fig. 2-15).

Job Control Number (JCN)

The job control number consists of fourteen alphanumeric characters. The first six characters are the service designator (R, V, or N) and unit identification code (UIC). The next four characters are the work center (WC) code (for example, "AAOO") as defined in COMCBPAC/ COMCBLANTINST 4400.3 series. The last four-character group is a locally assigned job sequence number (JSN).

WRONG PARTS!

Each year millions of dollars are wasted by ordering wrong parts. As a maintenance supervisor, you are responsible for ensuring that the Construction Mechanics assigned to the technical library are researching and ordering repair parts accurately. Strict adherence to proper supply procedures and a strong working relationship with your supply department will help prevent waste, save the government thousands of dollars, and curb unnecessary CESE downtime.

REPAIR PARTS TURN-IN

In the event, for one reason or another, that "the wrong parts" arrive at your site, do NOT ignore the problem. Such actions as hiding or burying them, giving them away, or destroying them are all illegal, and severe disciplinary action can be taken against you. Leaving these parts "on

the shelf in case of need" is also in conflict with supply instructions, and it clogs up your storeroom or shop. The proper procedure is to turn these parts in to your supply department and let supply dispose of the parts properly. Proper procedures may be obtained from the supply officer of your unit.

BATTALION EQUIPMENT EVALUATION PROGRAM (BEEP)

The reliability of equipment is one of the main factors in the ability of an NMCB to perform its assigned mission. Before you take a look at this program from the maintenance viewpoint, you should familiarize yourself with current COMCBPAC/COMCBLANTINST 11200.1 series. This instruction establishes uniform procedures to be followed during a battalion's on-site relief and equipment turnover.

The purpose of the battalion equipment evaluation program (BEEP) is threefold: (1) to pass on all special knowledge of CESE maintenance and operations techniques; (2) to provide the relieving battalion with a realistic and in-depth condition evaluation of CESE allowance, facilities, tools and materials; and (3) to use the full expertise and efforts of the two equipment forces to provide the relieving battalion and detachments with the best possible' 'A" Company operation to conduct a successful deployment.

RESPONSIBILITIES OF THE RELIEVING BATTALION

Before arriving on the site, the incoming battalion is responsible for the following:

1. Notify COMCBPAC Equipment Office, Port Hueneme, California; COMCBLANT Detachment, Gulfport, Mississippi; and the battalion being relieved of the commencement date of the BEEP at least 30 days before commencement date. It is recommended that the BEEP start at least 10 days before the arrival of the main body.
2. Provide information, as required, to COMCBPAC/COMCBLANT equipment representatives for the completion of the BEEP report.
3. Ensure that all personnel required for the BEEP (see COMCBPAC/COMCBLANTINST 11200.1 series, chapter 3, for personnel requirements) are assigned to the advance party.
4. Have sufficient supplies of NMCB decals for organic and augment equipment on hand.
5. Ensure that required documents and supplies accompany the advance party.

RESPONSIBILITIES OF THE BATTALION BEING RELIEVED

Before and during the BEEP, the battalion being relieved is responsible for the following:

1. Coordinate the BEEP commencement date with the incoming battalion.
2. Assign counterparts to personnel arriving with the incoming battalion, and ensure that these personnel remain on site until completion of the BEEP. Personnel should not be assigned to other duties that would conflict with their participation in the BEEP.
3. Make available all necessary tools and shop equipment with which to evaluate and repair the equipment.
4. Clean and make available all equipment for evaluation and repair.
5. Coordinate the scheduling of equipment for inspection with the incoming battalion.

NOTE

The recommended procedure is to schedule the equipment by PM group, using the appropriate number of PM groups to enable the BEEP to be completed within 10 working days.

6. Ensure that an ERO is prepared for each item of equipment with a copy of the Equipment Evaluation Inspection Guide (figs. 2-17 and 2-18) and also a copy of the Attachment Evaluation Inspection Guide (fig. 2-19), when appropriate.
7. Have two full workdays of CESE precleaned and staged before the commencement of the BEEP.

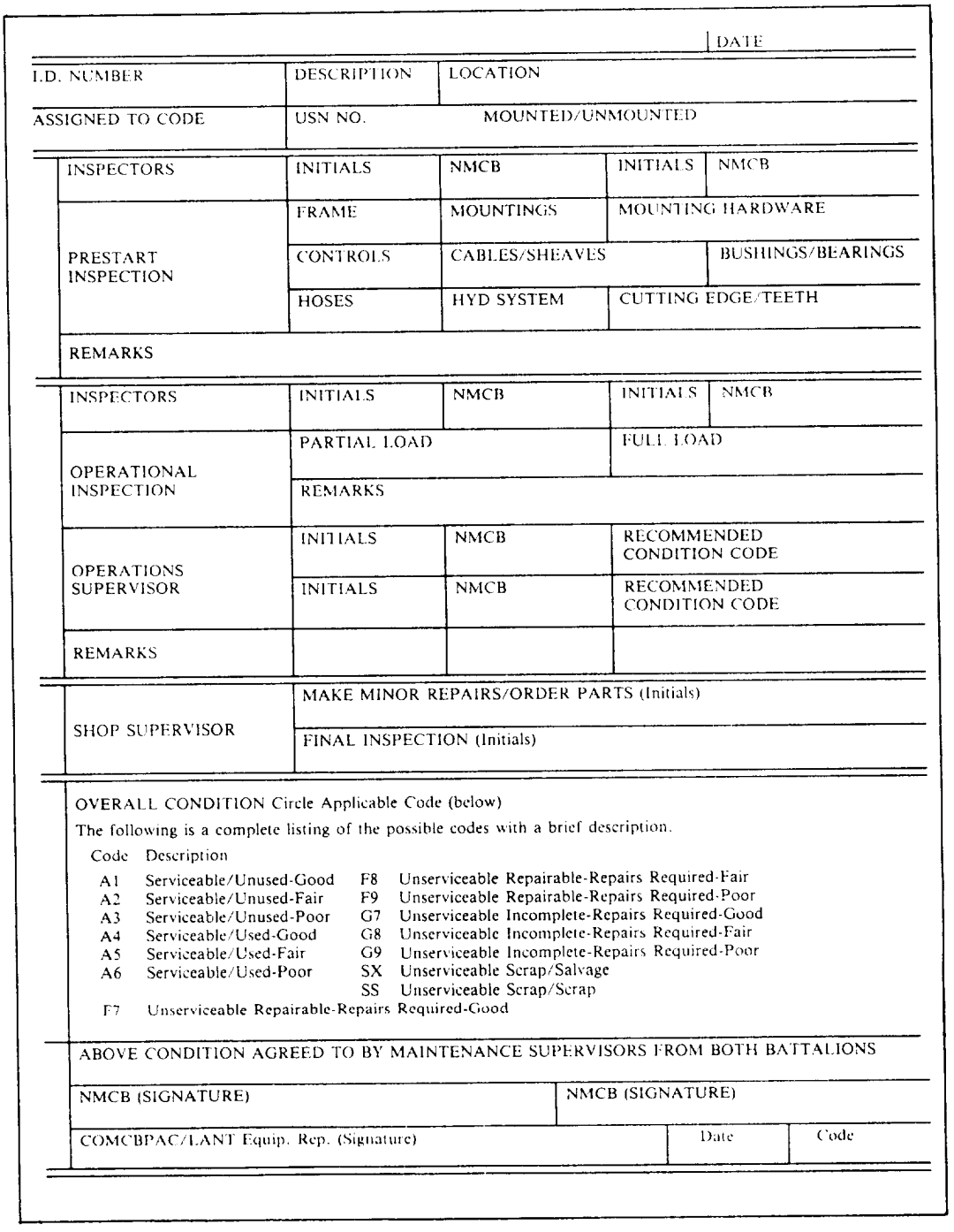
JOINT RESPONSIBILITIES

The following tasks are accomplished jointly by the battalions during the BEEP:

1. An inspection of all maintenance records, noting accuracy and deficiencies and updating as required.
2. A review and accountability of all maintenance correspondence that is pending final action.

			DATE		
	CODE	USN NO.	MILEAGE	HOURS	ENGINE SERIAL NO.
PRESTART INSPECTION	INSPECTORS	INITIALS	NMCB	INITIALS	NMCB
	COOLING SYSTEM	LEVEL	LEAKS	CONDITION	
	LUBRICATION SYSTEM	LEVEL	LEAKS	CONDITION	
	CHARGING SYSTEM	BATTERY LEVEL	BELTS	CABLES	CONNECTIONS
	LIGHTING SYSTEM	HEADLIGHTS	TAILLIGHTS	BLACK OUT	INSTRUMENTS
		CLEARANCE	REFLECTORS	REMARKS	
	FUEL SYSTEM	LEVEL	LEAKS	CONDITION	
	TIRES	SIZE	TYPE TREAD	CONDITION	INFLATION
		MOUNTED SPARE SIZE		CONDITION	INFLATION
	TRACKS	RAILS	PINS	SHOES	SPROCKETS
		IDLERS	REMARKS		
	MISCELLANEOUS	AUTO TRANS FLUID		MIRRORS	LUG NUTS
		CONTROLS	CABLES	DOORS	GLASS
		UPHOLSTERY		BODY CONDITION	
	REMARKS				
ENGINE RUNNING	INSPECTORS	INITIALS	NMCB	INITIALS	NMCB
	ACCESSORIES	INSTRUMENTS	WARNING DEVICES HORN		
		W/S WIPERS	BRAKES	CLUTCH	HAND BRAKE
	LEAKS	ENGINE	TRANSMISSION		TRANSFER CASE
		DIFFERENTIALS	BRAKES	STEERING	WINCH
	ENGINE PERFORMANCE	STARTING	IDLING	FULL LOAD	
		PARTIAL LOAD		REMARKS	
	VEHICLE PERFORMANCE	STEERING	BRAKES	CLUTCH	TRANSMISSION
		DIFFERENTIALS	TRANSFER CASE	PTO	WINCH
		HYD SYSTEM	DRIVE SHAFTS	UNUSUAL NOISE/MOTION	
	REMARKS				

Figure 2-17.—Equipment Evaluation Inspection Guide.



				DATE	
I.D. NUMBER	DESCRIPTION	LOCATION			
ASSIGNED TO CODE	USN NO.	MOUNTED/UNMOUNTED			
INSPECTORS	INITIALS	NMCB	INITIALS	NMCB	
PRESTART INSPECTION	FRAME	MOUNTINGS	MOUNTING HARDWARE		
	CONTROLS	CABLES/SHEAVES	BUSHINGS/BEARINGS		
	HOSES	HYD SYSTEM	CUTTING EDGE/TEETH		
REMARKS					
INSPECTORS	INITIALS	NMCB	INITIALS	NMCB	
OPERATIONAL INSPECTION	PARTIAL LOAD		FULL LOAD		
	REMARKS				
OPERATIONS SUPERVISOR	INITIALS	NMCB	RECOMMENDED CONDITION CODE		
	INITIALS	NMCB	RECOMMENDED CONDITION CODE		
REMARKS					
SHOP SUPERVISOR	MAKE MINOR REPAIRS/ORDER PARTS (Initials)				
	FINAL INSPECTION (Initials)				

OVERALL CONDITION Circle Applicable Code (below)

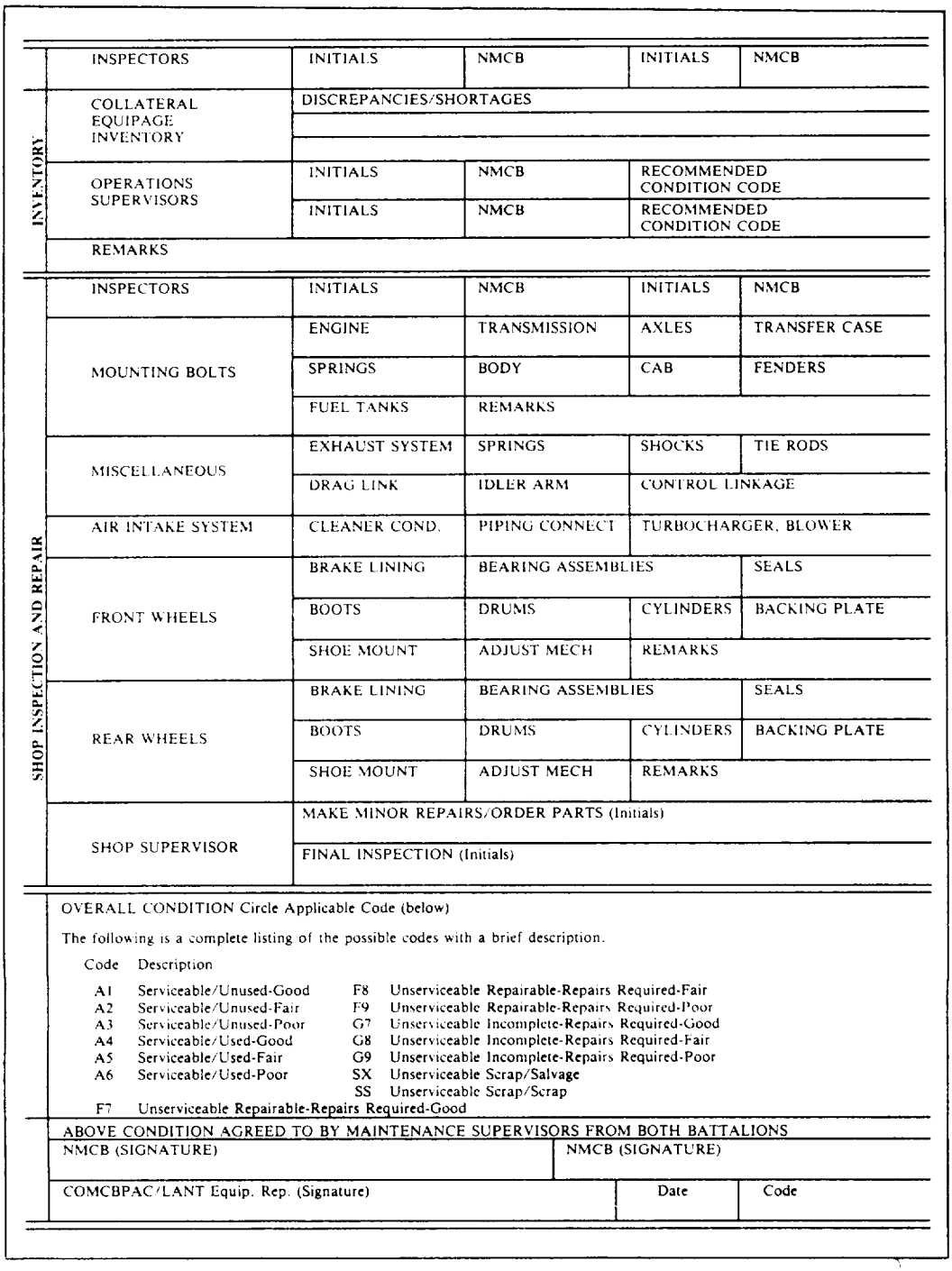
The following is a complete listing of the possible codes with a brief description.

Code	Description	Code	Description
A1	Serviceable/Unused-Good	F8	Unserviceable Repairable-Repairs Required-Fair
A2	Serviceable/Unused-Fair	F9	Unserviceable Repairable-Repairs Required-Poor
A3	Serviceable/Unused-Poor	G7	Unserviceable Incomplete-Repairs Required-Good
A4	Serviceable/Used-Good	G8	Unserviceable Incomplete-Repairs Required-Fair
A5	Serviceable/Used-Fair	G9	Unserviceable Incomplete-Repairs Required-Poor
A6	Serviceable/Used-Poor	SX	Unserviceable Scrap/Salvage
		SS	Unserviceable Scrap/Scrap
F7	Unserviceable Repairable-Repairs Required-Good		

ABOVE CONDITION AGREED TO BY MAINTENANCE SUPERVISORS FROM BOTH BATTALIONS

NMCB (SIGNATURE)	NMCB (SIGNATURE)	
COMCBPAC/LANT Equip. Rep. (Signature)	Date	Code

Figure 2-18.—Equipment Evaluation Inspection Guide—Continued.



INVENTORY

INSPECTORS	INITIALS	NMCB	INITIALS	NMCB
COLLATERAL EQUIPAGE INVENTORY	DISCREPANCIES/SHORTAGES			
OPERATIONS SUPERVISORS	INITIALS	NMCB	RECOMMENDED CONDITION CODE	
	INITIALS	NMCB	RECOMMENDED CONDITION CODE	
REMARKS				

SHOP INSPECTION AND REPAIR

INSPECTORS	INITIALS	NMCB	INITIALS	NMCB
MOUNTING BOLTS	ENGINE	TRANSMISSION	AXLES	TRANSFER CASE
	SPRINGS	BODY	CAB	FENDERS
	FUEL TANKS	REMARKS		
MISCELLANEOUS	EXHAUST SYSTEM	SPRINGS	SHOCKS	TIE RODS
	DRAG LINK	IDLER ARM	CONTROL LINKAGE	
AIR INTAKE SYSTEM	CLEANER COND.	PIPING CONNECT	TURBOCHARGER, BLOWER	
FRONT WHEELS	BRAKE LINING	BEARING ASSEMBLIES		SEALS
	BOOTS	DRUMS	CYLINDERS	BACKING PLATE
	SHOE MOUNT	ADJUST MECH	REMARKS	
REAR WHEELS	BRAKE LINING	BEARING ASSEMBLIES		SEALS
	BOOTS	DRUMS	CYLINDERS	BACKING PLATE
	SHOE MOUNT	ADJUST MECH	REMARKS	
SHOP SUPERVISOR	MAKE MINOR REPAIRS/ORDER PARTS (Initials)			
	FINAL INSPECTION (Initials)			

OVERALL CONDITION Circle Applicable Code (below)

The following is a complete listing of the possible codes with a brief description.

Code	Description	Code	Description
A1	Serviceable/Unused-Good	F8	Unserviceable Repairable-Repairs Required-Fair
A2	Serviceable/Unused-Fair	F9	Unserviceable Repairable-Repairs Required-Poor
A3	Serviceable/Unused-Poor	G7	Unserviceable Incomplete-Repairs Required-Good
A4	Serviceable/Used-Good	G8	Unserviceable Incomplete-Repairs Required-Fair
A5	Serviceable/Used-Fair	G9	Unserviceable Incomplete-Repairs Required-Poor
A6	Serviceable/Used-Poor	SX	Unserviceable Scrap/Salvage
		SS	Unserviceable Scrap/Scrap
F7	Unserviceable Repairable-Repairs Required-Good		

ABOVE CONDITION AGREED TO BY MAINTENANCE SUPERVISORS FROM BOTH BATTALIONS

NMCB (SIGNATURE)	NMCB (SIGNATURE)	
COMCBPAC/LANT Equip. Rep. (Signature)	Date	Code

Figure 2-19.—Attachment Evaluation Inspection Guide.

3. An inventory and inspection of all permanent ALFA Company shop equipment, noting condition and deficiencies.

4. A preventive maintenance inspection to the BPM level on each nonpreserved item of USN-numbered equipment assigned, using the Equipment Evaluation Inspection Guide. Accomplish all repairs possible, dependent upon the work force, space, and repair parts available as determined jointly by both maintenance supervisors.

5. A preventive maintenance inspection of all equipment attachments, using an Attachment Evaluation Inspection Guide. Accomplish all repairs possible, dependent upon the work force, space, and repair parts available as determined jointly by both maintenance supervisors.

6. A visual inspection of each preserved item of assigned USN-numbered equipment, using an Equipment Evaluation Inspection Guide. The equipment is not depreserved for testing unless visual inspection shows major discrepancies.

The equipment condition codes as defined below are used in completing the parts of figures 2-18 and 2-19 that describe the overall condition of the equipment being BEEPed. Complete definitions of the codes are as follows:

A-Serviceable. New, used, repaired or reconditioned equipment that is serviceable for its intended function.

1-Unused-Good. Unused equipment that is usable without repairs and is ready for use.

2-Unused-Fair. Unused equipment that is usable without repairs, ready for use, but somewhat deteriorated.

3-Unused-Poor. Unused equipment that is usable without repairs but has considerable deterioration or damage.

4-Used-Good. Used equipment that is usable without repairs and most of its useful life remains.

5-Used-Fair. Used equipment that is usable without repairs but is somewhat worn or deteriorated and may soon require repairs.

6-Used-Poor. Used equipment that may be used without repair but is considerably worn or deteriorated. Remaining utility is limited or major repairs will soon be required.

F-Unserviceable (Repairable). Economically repairable equipment that requires repair or reconditioning.

G-Unserviceable (Incomplete). Equipment requiring additional parts or components to complete before issue. Also includes items with a long lead time, additional part requirement.

7-Repairs Required-Good. Required repairs are minor and should not exceed 15 percent of the replacement cost.

8-Repairs Required-Fair. Required repairs are considerable and are estimated to range from 16 percent to 40 percent of replacement cost.

9-Repairs Required-Poor. Required repairs are major and are estimated to range from 41 percent to 65 percent of replacement cost.

S-Unserviceable (Scrap). Equipment that has no value except for its basic material.

X-Salvage. Property that has some value, but repair or rehabilitation to use for the intended purpose is clearly impractical. Cannibalization of parts is possible.

X-Scrap. Material that has no value except for its basic material cost.

NOTE

Repair costs by percentage of replacement as set forth in numerical coding will pertain to deadlined equipment only.

COMCBPAC/COMCBLANT RESPONSIBILITIES

Representatives from COMCBPAC or COMCBLANT will be present at each BEEP and will remain on board until all phases of the BEEP have been completed. The primary duty of the representives is to present guidelines to personnel from both battalions that they are to cover and adhere to during the BEEP. (These guidelines are listed in the COMCBPAC/COMCBLANT-INST 11200.1 series, page 157, paragraph 3702.) Specific responsibilities of the COMCBPAC/ COMCBLANT representatives are as follows:

1. Provide technical assistance during the BEEP.

2. Authenticate all NAVSUP Form 1250-1s and 1250-2s generated during the BEEP.
3. Assign all final CESE condition codes.
4. Conduct a post-BEEP critique for appropriate personnel of both battalions.
5. Prepare and submit a BEEP completion report to COMCBPAC or COMCBLANT, with copies to appropriate addresses.

KEEP IN MIND THAT SAFETY WILL BE PARAMOUNT THROUGHOUT THE ENTIRE BEEP

REPAIR PARTS

The repair parts portion of the BEEP will be accomplished according to COMCBPAC/COMCBLANTINST 4400.3 series, appendix C.

EMBARKATION

As indicated in the name, mobility is a major portion of the tasking of each Mobile Construction Battalion. The battalion maintains a staff that preplans for given situations. They work with the air detachment, air echelon, and sea echelon scheduling for ships or planes. The embarkation staff determines and adjusts load requirements to fit the type of units doing the transporting. As a CM1, you will be tasked to communicate with the embark staff through your chain of command. This communication will include changes in types of equipment available, deadlined units designated as air detachment or air echelon, and parts requirements changes.

SCHEDULING

Scheduling of equipment through the shop during embarkation depends on which equipment is to be embarked, the number of mechanics available, and time allowed. All equipment must be thoroughly cleaned, and time must be allotted for this operation. Air detachment equipment will receive top priority. As a shop supervisor, you will find that your input and knowledge of the mechanic's capabilities will be vitally important.

INSPECTING

Equipment to be embarked should have minor repairs accomplished before embarkation. These units must be capable of operating for some time without breakdown. Deadlined units on the sea echelon may be repaired under way. Equipment to be transported aboard aircraft will be delayed if fuel, oil, and water leaks are not detected during your inspection and corrected while in the shop.

PREPARING

Coordinated preplanned efforts between the mechanics, wash rack personnel, collateral equipment, and Equipment Operators are essential for a successful embark. All collateral equipment has to accompany the unit for which it was intended; spare tires have to be mounted. Depending on the method of transporting, dump truck headache boards need to be removed and secured in the bed, tops removed, windshields put down and taped, and exhaust stacks loosened. It is often required that the buckets and counterweights of front-end loaders be removed. Detailed data for each unit will be coordinated between the embark staff and the transporting unit.

STAGING

After the equipment has undergone the shop requirements, it might need to be loaded with designated equipment. All air-transported units must be weighed and the center of balance marked in the configuration in which it is to be loaded. After this has been accomplished, it maybe staged for convoy or movement in a place that is not congested and does not interfere with continued progress of equipment in process.

TRANSPORTING

Often a convoy movement is required to reach the transporting unit. This operation may be used to arrange equipment in load-number order if it was not done during the staging phase. Loading and tie-down are normally under the directions of the loadmaster of the aircraft or the boatswain of the ship.

HAZARDOUS MATERIALS

WARNING

Materials required to operate a maintenance organization are often toxic, corrosive, explosive, or highly flammable. These materials (paints, gases, acids, fuels,

lubricants, and so on) are to be located where they are convenient to the users, secured safely (locked up), and at a safe distance to minimize injury in the event of a mishap. Warning signs pertaining to hazardous materials are required to be posted. The shop safety petty officer is to be aware of all of the locations of these materials in the maintenance shop. All shop personnel have to be briefed and are to understand fully countermeasures to take in the event of an accident. Complete safety instructions for hazardous materials storage are listed in the U. S. Army Corps of Engineers *Safety and Health Requirements Manual,* EM 385-1-1.

STORAGE

Fuels may be stored in underground tanks, fuel bladders, or properly equipped fuel tankers. The method of disbursing fuels depends on whether the site is temporary or not. At a temporary site, drummed fuels may be used. When selecting a fueling site, consider the accessibility of vehicles requiring fuel. Tracklaying equipment and automotive equipment are usually fueled in separate areas to avoid congestion.

Paints and lubricants are inventoried by the supply department. However, you are responsible for storing those in use or drawn in large quantities. **Storing lubricants properly includes taking steps to prevent fire or contamination by water.** Paints should be stored away from flames. Provide a fire-resistant area for paints stored inside a building. A well-constructed metal CONEX box is generally suitable for small quantities. By using good housekeeping practices, you can help avoid accidents or fires.

Gases normally used by Construction Mechanics include oxygen, acetylene, MAPP-gas, helium, and butane. The U.S. Army Corps of Engineers *Safety and Health Requirements Manual,* EM 385-1-1 is the current reference for safe handling and storage of compressed gases.

WARNING

Oil and grease must NOT be allowed to come in contact with gases; if they do, they may explode or burn out of control.

Compressed gas containers will be segregated and stored in the manner prescribed at specific distances from each other and working areas.

Acid or electrolyte used in the battery shop is to be stored in an upright position on a stable platform. This space is to be well ventilated, A facility for quick drenching of the eyes is to be available in this area.

SPILLS AND CLEANUP

When spilled in the shop, fuels are hazardous. They cause fires and accidental falls and they contaminate air and water. Small spills can be cleaned with absorbents that must be disposed of properly. Good housekeeping means fewer accidents.

Spills at fueling stations are normally smaller than bulk fuel spills. They may be absorbed with sand or oil dry types of absorbents. These absorbents must be properly disposed of also.

Fueling spills spell fire! Hosing the affected area with water will dilute the fuel to a degree, but it will also spread the fuel over a larger area. Fuels may contaminate water systems as well as sewer systems. **Should a large quantity of volatile fuel enter a sewer system, notify proper authorities.**

Oil drums at fueling stations used by the Equipment Operators must have a catch trough for spillage. Oil caught in this way is placed in a container for waste oil. Waste oil from service stations, shops, and lubrication areas is disposed of by re-refining when possible.

Using waste oil as a dust or weed control agent is prohibited, because this oil often washes into water systems during heavy rains. Burning of waste oil contributes to air pollution and is prohibited. Re-using or burning waste oils is allowed in large power plants that can separate contaminates or blend the waste with fuel properly.

Field repair personnel are responsible for collecting oils and fuels drained during repair operations. **Spilled lubricants penetrate the soil and could reach the groundwater table.** Contaminating the groundwater table may harm local drinking water. Immobilize a ground spill by adding dry soil to soak up the spill. To prevent contamination of the water table, collect the waste lubricants and return them to a collection point for disposal. You must develop contingency plans in case of a hazardous material spill. OPNAVINST 4110.2 (series), *Hazardous Material Control and Management,* and OPNAVINST 5090.1 (series), *Environment and Natural Resources Protection Manual* provide detailed information.

DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO)

Do not let your maintenance area become the ALFA Company junk yard. Unneeded materials and CESE that have no further use, worn-out CESE components, batteries, tires, and so on, are to be turned in to the Defense Reutilization and Marketing Office (DRMO) to "clean house." Contact your supply officer and local DRMO for proper turn-in procedures.

CESE DISPOSAL

Disposition instructions for CESE assigned to an NMCB come from COMCBPAC Equipment Office in Port Hueneme, California, or COMCBLANT DET, Gulfport, Mississippi. Only upon receipt of these instructions may disposal be initiated.

A. Follow the procedures outlined in the disposal letter/message.

B. Remove all unit decals and stencils from the equipment.

C. On or before the predetermined date in the disposal letter/message, using a DoD Form 1348-1 as a turn-in document, deliver the equipment, its attachments, and its history jacket to the nearest DRMO. (List on the 1348-1 all attachments accompanying the unit to DRMO.)

NOTE

Unless otherwise directed, all collateral equipage and attachments assigned to that particular unit will accompany the unit to DRMO.

D. Upon completion of action, forward a copy of the disposal letter/message with a copy of the signed DD Form 1348-1 turn-in document as an enclosure to COMCBPAC Equipment Office or COMCBLANT DET within 15 days of disposal action.

E. Adjust your CESE inventory records, status boards, DTO files, DTO room, and so forth. Notify supply and the dispatch supervisor of your actions.

NOTE

Disposal letters/messages are not blanket cannibalization authority. If your shop needs parts from a piece of CESE going to DRMO, request authority from COMCBPAC Equipment Office or COMCBLANT DET to remove such parts.

HAZARDOUS MATERIALS DISPOSAL

Hazardous materials have special turn-in procedures. For instance, batteries must be drained of all electrolyte before turn-in. The electrolyte is turned in separately in a separate container. Both items, electrolyte and batteries, are to be palletized and marked "HAZARDOUS" before turn-in. If in doubt of any hazardous material turn-in procedures, contact your local DRMO office.

REFERENCES

Naval Construction Force Equipment Management Manual, NAVFAC P-404, Naval Facilities Engineering Command, Washington, D.C., 1988.

Naval Construction Force Manual, NAVFAC P-3 15, Naval Facilities Engineering Command, Washington, D.C., 1985.

U.S. Naval Construction Force Embarkation Manual, COMCBPAC/COMCBLANTINST 3120.1, 1988.

U.S. Naval Construction Force Equipment Management Manual, COMCBPAC/COMCBLANTINST 11200.1D, 1988.